



# 2020-2021 Huang Fellows Program



The Huang Fellows Summer Program has genuinely changed me as a person through its diverse yet superb programming. Learning from leading research experts at Duke talking about topics spanning from their research in Artificial Intelligence to race equity issues in academia, I've learned to become a better leader, researcher, and person.

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# The Gates of Science: A Reflection on Dr. Jeff Baker's Seminar

Aarushi Venkatakrishnan, Class of 2023

Aarushi is a sophomore from Charlotte, NC, interested in studying Public Policy and Biology on a pre-med track. She is particularly interested in alternative medical therapies, and currently, Aarushi works under Dr. William Parker in his Immune Dysfunction and Evolutionary Mismatch Lab to study the biota alteration theory and how it may translate to future therapies. She wants to use her education to provide a safer healthcare environment for everyone, regardless of gender, race, or class backgrounds. As a Huang Fellow, Aarushi hopes to view medicine from a bolistic perspective to greater understand how to make a lasting difference on society.

Wash your hands before eating. Keep away from sick people. Visit the plant doctor if you feel sick. That mostly sounds familiar right? I maybe wouldn't trust my poorly watered aloe vera plant with my health, but luckily for me, I'm confident that it's not certified to practice medicine. These semi-familiar precautions were some of the first social distancing measures implemented in the US during the 1918 Spanish Flu and provided some of the basis to how we formed our COVID-19 response today.

This was just one of the parallels brought up by Dr. Jeff Baker, a (non-plant) doctor with a PhD in the history of medicine. During our 90-minute session, we explored two major events in US history – the Spanish Flu and the Polio crisis – and discussed how themes of heroism emerge in a crisis, how our modifications to the Spanish Flu public health campaigns may have perpetuated socioeconomic disparities, and how science has become largely politicized. While the specifics of these diseases are shocking, it's more eye-opening to see how striking these messages are in hindsight.

We all learned about or at least heard about the Spanish Flu and Polio in the past, but it wasn't until I heard Dr. Baker speak that I recognized the same messages he did. Throughout this summer, I've been in awe of how easily my mentors can dissect high-level science and connect dots that I couldn't even see. My personal experience has been far different. Even after reading paper after paper, I often find it difficult to understand the information and recognize what I'm looking for when I see it.

If science is a kingdom that holds almost infinite amounts of information, it feels like I can make it to the gate, but not past the jargon guards. Not to mention, as a student I can access many journals for free, but for the general public, there can be the extra hurdle of a pay wall. We have made it so far in society today due to science, yet we've put up barriers to access it.

From what I can remember, it has been like this for a while. I'll admit that I never was a fan of reading textbooks. Ordinary books, definitely. I loved spending time reading the Harry Potter books or even the assigned school reading every summer. But somehow, reading an excerpt from one of my heavy textbooks always made me yawn. Now, I've built up strategies to tackle the various scientific literature I've been assigned for my classes and research, hoping that experience will one day unlock the gate. But should our findings really be locked up in a way that we need tools to decipher them? Why do we need these barriers of entry into science? If anything, we need to make it more accessible and easier to understand. If science can't be communicated clearly, it doesn't mean anything.

If I asked you to tell me the plot of a story or movie you remember from your childhood or describe a lesson you learned in your high school chemistry class, I think it's safe to assume the majority of us would choose the first option. Maybe that's because our childhood memories hold a special significance with us, or that our passions just don't lie with specific classes. In an ideal world, the preferences for that question wouldn't matter, and people would be able to accurately describe an answer to both. But speaking from my own experience, I would not be able to confidently repeat a lesson from my recent organic chemistry class off the top of my head.

It's funny how easy it is to remember movies and books. Even in genres I don't particularly like, plots tend to stick with us. Maybe science could do better by taking a page out of the entertainment industry's book to learn about communication. There's no reason for us to stick with the convoluted language and intimidating nature of science, especially when we've discovered so many other possibilities.

COVID-19 is, as Dr. Baker believes, revealing the fundamental flaws within our society – bringing us a unique opportunity to look our inadequacies in the face. We must shift the way we think about learning in order to actually take away the important information and create a level playing field to empower people in our society.

# 20 Fellows

#### MAJORS

- Biology (1)
- Biomedical Engineering (2)
- Biophysics (1)
- Chemistry (2)
- Computer Science (5)
- Cultural Anthropology (3)
- Economics (1)
- Electrical and Computer Engineering (1)
- Environmental Science (1)
- Global Cultural Studies (1)
- Mechanical Engineering (2)
- Neuroscience (4)
- Physics (1)
- Public Policy (2)

#### MINORS & CERTIFICATES

- Biology (2)
- Chemistry (5)
- Computer Science (1)
- Energy & Environment Certificate (2)
- Global Health (1)
- History (2)
- Innovation & Entrepreneurship (1)
- Philosophy (1)
- Political Science (1)
- Science & Society (3)
- Sociology (1)
- Statistics (1)

This information reflects intended majors of the Class of 2023 Huang Fellows at the beginning of the 2020 spring semester



# **Broken Records:** Reflections on Dr. Jeff Baker's Seminar

Shawin Vitsupakorn, Class of 2023

Shawin is a sophomore from Northern Virginia planning to study neuroscience with minors in global health and psychology. He is drawn to the intersections of psychology and neuroscience, although biological bases may explain certain behaviors, people undergo external pressures as well, whether from society, family, or peers. His passion for public health is inspired by experiences in Thailand. Despite the country's universal coverage scheme, disparities persist across rural-urban and public-private health systems. As a Huang Fellow, he hopes to explore this complex interweave of determinants and strive toward more equitable healthcare in global communities.

# *"History doesn't repeat itself, but it often rhymes."*

A quote often attributed to Mark Twain, though its origins may forever be up in the air. Nevertheless, they were among the first words that Dr. Jeff Baker shared with the Huang Fellows this summer.

Both a physician and a medical historian by training, Dr. Baker brought with him expertise on past pandemics. Right from the start, we understood that his case studies, while stretching back to the 1900s, would inform the present day in some way or another. After all, the world is suffering through the COVID-19 pandemic. Yet, a part of me became confused. Again and again, we've been told how "unprecedented" this situation is. We've been blasted with talks of a "new normal" and as students, constant reminders that schools are trying their best to adapt to evolving times. I mean - here we were, as socially distanced as can be, communicating through the Zoom chat box, applause emojis, and "raise hand" icons. But just how "unprecedented" are the current circumstances?

Dr. Baker started his seminar by carefully noting the historical responses from the American government, academia, and public, to three health crises. We learned about how so-

cial distancing interventions were key during the 1918 flu pandemic, a time when medicine could not help. Coinciding with the end of World War I, the American psyche was gripped by anti-German sentiment, rather than broader xenophobia. We then moved on to polio. It was first misconstrued as a "white" epidemic when in reality, was more influenced by socioeconomic status. A successful vaccine would parade scientific research into the limelight. Finally, Dr. Baker spoke on HIV/AIDS in 1980s America. How it was first fear-mongered and coined as a "gay-related immune deficiency," driving the public into hysteria. How the antiretroviral drug AZT came with a hefty price tag: \$8,000 a year. And how the "ACT UP" movement pushed for transformative policy changes that would fast-track drug approval (as a bonus, we even got to see a more freshfaced Fauci on Dr. Baker's presentation slides).

As we drove through memory lane, I couldn't help but think about the connections between the two centuries. For me, someone whose history lessons had rarely centered on science, these connections were mostly untapped. With Dr. Baker at the wheel, the puzzle pieces began to fit together.

We cannot deny all of the loss that the COVID-19 pandemic has brought upon the

world. Vulnerable populations are now even more vulnerable. A global recession means that bank accounts are strained and food, hard to put on the table. Patients have their dying moments not with family, but with N95 masks, face shields, and blue, floaty gowns. And the healthcare workers who can treat them? Countless are to fend for themselves, disposable equipment made non-disposable.

For many, this situation is new. But if we were to set the record just a century back, we can draw parallels between the past and present:

We can see a conceptualization of the "other." The gay community was left to the fringes of society as scapegoats of HIV/AIDS, and associations were conjured up between immigrants and bubonic plague, typhus, and cholera cases in America. Already unfolding is the branding of SARS-CoV-2 as a "Chinese virus" and the anti-Asian racism that comes with it.

We can unearth learning experiences. For one, the celebration of science in developing the 1955 polio vaccine contrasts with the distrust of science in today's social distancing and mask-wearing. The fact that past pandemics and COVID-19 have disproportionately affected people of color, namely, Black, Hispanic, and Indigenous communities.

After our discussion with Dr. Baker, it was clear that the COVID-19 era in America is an echo of earlier times. Collectively, we still have one unanswered question. Will we learn from the past, or will we keep hearing the same old tunes of a broken record?

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# Dr. Ravi Bellamkonda: Career Talk Reflection

Andrew Liu, Class of 2023

Andrew Liu is a Pratt student from Houston, TX, boping to major in Mechanical Engineering and Computer Science and minor in Chemistry. When he's not stitching together catapults, he enjoys singing, listening to movie soundtracks, and playing a plethora of sports. Though previously a lover of the bard sciences, Andrew's always had a soft spot for the natural environment. With humanity and more importantly, mother nature, potentially at the brink of runaway temperature rise, he feels that anthropogenic climate change is more relevant than ever. Among the global sources of greenhouse gas emissions, energy contributes almost half of all emissions and more than three times as many as any other source. He's enthusiastic about the prospect of researching original engineering systems paired with novel chemical reactions to create cleaner energy innovations, and can't wait to explore the impact of such research as a Huang Fellow.

From my elementary school to my high school years, success was always sought after in the household and included a variety of achievements ranging from getting "good grades" to achieving the best rating at a violin recital. All of these targets were set, of course, with the ultimate, far-in-the-future goal of obtaining a stable job after college. Though I was an active participant in these activities and recognized that attaining a stable career was a good thing, it wasn't until my latter high school years that I contemplated the meaning of such success. In his career talk, Dr. Bellamkonda emphasized that success goes beyond simply professional success, reminding me that the most important parts of overall success may be the personal ones. Importantly, Dr. Bellamkonda mentioned that such professional success should exist in the context of something personally meaningful, and that this meaning contributes to one's success. Dr. Bellamkonda challenged us to view the world around us as "mendable," and to take meaningful action toward mending the world for the better. This personal, meaningful action, though possibly separate from one's professional success, adds to the overall success.

Dr. Bellamkonda was guick to note, however, that while these measures of success are significant, they represent the external components of success. Meanwhile, internal success, though considerably less tangible, arguably represents a more important part of success. In particular, however outstanding any professional success, that which lacks accompanying happiness lacks true value. With this in mind, Dr. Bellamkonda outlined the three kinds of happiness that we may experience - that which is fleeting, after purchasing a new car, for example; that which stems from personal immersion and excitement, which lasts longer; and that which stems from meaning and purpose, which lasts longer still. It is this last happiness, Dr. Bellamkonda said, that represents the major component of internal success. Without it, we cannot truly be successful, no matter how many digits our salary contains or how many admirers we have among us. Thus, as we seek to fill our lives with "success," we must remember that we live in a changing world, and so we must do our best to "mend" the world for the better. We must find purpose in what we do and connect our actions to personally fulfilling meaning. Hopefully, then, we can be happy doing it.



# Dr. Lawrence Carin: Huang Fellows Reflection

Maya Ghanem, Class of 2023

Maya Ghanem is a Trinity student planning to major in chemistry and cultural anthropology. She's fascinated by both the technological aspects and social implications of renewable energy technologies. As a Huang Fellow, she aspires to learn about what energy sources are best suited for local communities, based not only on technological and environmental factors, but also on cultural, political, and economic factors. Having been exposed to energy monopolization in Lebanon, her mother's home country, she also hopes to focus on energy issues and inequities in the Middle East. At Duke, she's an energy writer for SciPol.org, a writer for the Juhood magazine, and a member of the Muslim Students Association.

We have all witnessed Duke make historic administrative changes, in the midst of a pandemic and the Black Lives Matter movement, for the upcoming semester. As an outsider to the Duke administration, I've wondered about the nature of university leadership, especially in this unprecedented time. Even though Dr. Lawrence Carin was not scheduled to discuss our current climate with the Huang Fellows, I noticed true leadership in the care and attention he paid his students as a Duke professor and vice president of research. I learned about Dr. Carin's commitment to teaching the relevance of artificial intelligence (AI) in every field of study, but I also saw his dedication to enhancing the education of every Duke student. Most importantly, despite his vast experience with material technology, Dr. Carin's emphasis on treating all people with dignity and care is imminent in both his words and his work.

Our world is increasingly digitized, resulting in technological developments that can have real impacts on the human experience. For example, Dr. Carin discussed the integration of AI in Law and Literature: if researchers need to conduct an extensive literature survey with an overwhelming amount of documents, they could use AI to automate this process. Drawing from my own interests in the impact of environmental exposures on health outcomes, I realized the utility of AI in tracing environmental factors on the human body, a feat which has historically been difficult in toxicology. In his own career, Dr. Carin has applied artificial intelligence to voting behavior, music, and neuroscience, among other topics. But, how can we prepare for the emerging role of artificial intelligence?

As I began to comprehend the ever growing implications of data science in our daily lives, I made a mental note to prepare for these new changes by taking at least one computer science class before I graduate. However, I soon realized that with a Duke education, my exposure to data science could reach far beyond a single course. According to Dr. Carin and President Price, all Duke students should acquire the ability to make coherent arguments based on data. For instance, instead of asking a biology student to count, segment, or track cells by hand, a biology course should include instruction of undertaking such a process with AI, and subsequently teach students to analyze and draw a conclusion based on biological data. To incorporate data science throughout Duke curricula, Dr. Carin started...

"Dr. Carin started the Duke Center for Computational Thinking (pictured below), which has three goals: (1) increase exposure to data science among all Duke students, (2) make data science co-curricular to fundamentals in a computer science degree, and (3) raise ethical questions in data science to promote data citizenship."



Photo from the Duke Pratt School of Engineering

Photo by Brent Lyons

...Duke's Center for Computational Thinking, which has three goals: (1) increase exposure to data science among all Duke students, (2) make data science co-curricular to fundamentals in a computer science degree, and (3) raise ethical questions in data science to promote data citizenship. Although I do not intend to major in computer science or engineering, I definitely plan to take advantage of the opportunities presented by the Center for Computational Thinking.

Above all, Dr. Carin emphasized the importance of caring for others and treating

people with respect, regardless of profession. As students, we all strive for top tier GPAs and technical skills, but Dr. Carin instead asks us to prioritize love in humanity. I often worry about whether I am on the right path. Is my major right for me? What classes should I take? How can I take the most out of my Duke experience? Among all the buzz of a college student in an increasingly digital world, Dr. Carin reminded me what really matters: leading a life with service, empathy, and purpose through human connection.



# Choosing the Dark: Dr. Nita Farahany's Seminar

Rithik Castelino, Class of 2023

Ritbik Castelino is a premed, undergraduate student from the San Francisco Bay Area, working towards becoming a general surgeon. As a surgeon, he wants to be both incredibly technically adept, and someone who patients can trust will see them as more than just another operation. Other notable academic interests also include end of life patient care and medical care in low-resource communities. Outside of academics, you will often find Rithik training for his next tournament with the Duke Club Taekwondo team or playing some fantastic music with the Duke University Marching Band.

Whether it is learning how to speak new languages, to treat patients, to bake a recipe, or to love, our ability to learn and to change the world around us is dependent on what information we have. If you are a scientist, you might call it data. Or, you may simply call it google search results, newspaper articles, or even just life experience. I believe that information, when it is true and honest, is valuable beyond measure.

But this summer, Dr. Nita Farahany, Duke Law Professor and Director of the Duke Initiative for Science & Society, argued that we may not want to know something even if it is true due to possible ethical repercussions. We may not want to know if removing the neural-activity blockers from Yale's BrainEx experiment, that famously restored cellular function in once dead pig brains, will also restore electrical activity, or even consciousness. I can't help but agree.

Is it frustrating and frankly disappointing not to know? Absolutely. But pause and think about the ramifications of knowing the result of removing some neural-activity blockers. I'll wait.

Brain-dead. No pulse. No breath. Such a

person in most circles would be described as dead. Yes, nowadays we have machines that can mechanically take over the role of one's heart and lungs. This isn't new information. But that first descriptor, "brain-dead," at least for me, if you'll pardon the crude metaphor, has always been the nail in the coffin. But with BrainEx as a first stepping-stone, what happens if we devised a way to mechanically restore both cellular and electrical brain function? When does one shut a patient's eyes?

Dr. Farahany chose this case study for a reason. Through it, she introduced the idea that ethics should not be seen simply as guardrails that prevent science from driving society into apocalyptic scenarios. Instead, the ethical implications of scientific work should be considered from the start. You might ask yourself, why were the neural-activity blockers even used in the first place. Well one reason, is that the scientists themselves, terrified, had realized what they might discover if they didn't. Ethics was interwoven.

So, I will still stand by the phrasing that I used at the beginning of this reflection, but with one slight modification. Information, when it is true, honest, and responsible, is valuable beyond measure.



# David Hoffman Seminar: Huang Fellows Reflection

Albert Sun, Class of 2023

Albert Sun is a Trinity student from San Ramon, CA. He's always been fascinated by bistory and public policy. After coming to Duke, he has realized that harnessing big data is crucial to an intricate understanding of climate change, housing, and education policy. As such, he plans on pursuing a Program II track that explores inequality studies through data science and historical analysis. Outside of class, you'll find him competing with the Duke Mock Trial team and serving as an RA on East Campus. After his undergraduate studies, he'd love to work at a nonprofit and eventually pursue a JD degree, where he'll fuse his understanding of science and the law.

If you had to give important, confidential information to someone, would you trust Edward Snowden, Mark Zuckerberg, or the NSA Director Paul Nakasone with your information? Duke Law Professor David Hoffman led his seminar with this question.

I'd choose Snowden to keep my data. He doesn't have any vested interest in exploiting my data, and the organizations that Zuckerberg and Nakasone represent are known to lie to their stakeholders. This is proven by Facebook's high-profile Cambridge Analytica scandal and NSA's blatant global surveillance overreach exposed by Snowden in 2013.

The Huang Fellows were split on this topic. Hoffman says that he gets mixed responses whenever he asks his law students this question. He acknowledged that people have varied understandings and definitions of data privacy.

It's good to have well-informed opinions about our data, and during Hoffman's presentation, I learned how little I actually knew about my own data laws. As a Californian, I didn't know about the California Consumer Privacy Act. I didn't even know that the Federal Trade Commission was the organization that regulates consumer data protections for companies.

I think we all have a little to learn about data privacy. Put it this way: have you ever actually read the terms and agreements when signing up for new online services? It's not anything new for Americans to not understand policies that govern their lives. According to a Haven Insights Poll, only 37 percent of Americans could name their elected Representative. Policy illiteracy is especially true for data protection laws, which are often dense, varied, and always changing.

We need to become more responsible in our understanding of data usage. We live in an increasingly data-driven world. It's difficult to find a part of our lives that isn't tracked by our mobile devices and the "Internet of Things". Data confidentiality is very important during a global pandemic when countries are beginning to wield fancy contact-tracing technologies that trade-off with individual liberties.

I've always been interested in leveraging data science to inform policy analysis. Meeting Hoffman, I became fascinated in understanding the converse: how we can use laws to understand and manage data? Professor Hoffman put us in the shoes of a policymaker to find out. He split us up into Breakout Rooms (aka. the equivalent of a "turn to the person on your left" at Zoom University), and he gave us a hypothetical scenario of creating a contact tracing tool with geo-fence isolation capabilities. This theoretical technology would alert the North Carolina Department of Health and Human Services if someone with symptoms stepped out of their home.

If you have been paying attention to the new technologies to place people on house arrest, you might be concerned. It's important that people stay quarantined, but mass surveillance technologies have a history of disproportionately targeting minorities and communities of color. It's nothing new for people to analyze latent racism and discrimination in data science and Machine Learning algorithms. The general public should fight harder for better data protection.

By putting us in scenario planning "Breakout Rooms", Hoffman led us to find our own personal stakes in the way our data is handled. I'm interested in understanding how abuses in data privacy can intersect with those of the criminal justice system.

The outrage over Cambridge Analytica and the NSA's global surveillance techniques show that the general public is becoming more literate about the laws that surround their data privacy. I think that it's important that we continue to advocate for ourselves when our personal data is being used or surveilled.





# Dean Klotman Seminar: Huang Fellows Reflection

Kristin Ankoma-Sey, Class of 2023

Kristin Ankoma-Sey is a sophomore from Houston, TX, planning to major in Cultural Anthropology with a minor in Chemistry. She hopes to attend medical school and later pursue a career in medicine. Kristin is fascinated by how societal issues and the history surrounding them affect the delivery of healthcare. As a member of Duke University's Honor Council, she has engaged in several discussions about ethics, and believes addressing and understanding the role of ethics in science, healthcare, and medicine is vital in order to recognize and meet the medical needs of underserved communities. As a Huang Fellow, Kristin is excited to have the opportunity to participate in research and conversations that involve society, ethics, and science.

During this year's Career Series, we had the opportunity to hear from and engage with a wide variety of leaders at Duke, it was apt that the final speaker in this year's series, Dr. Mary Klotman, the current dean of Duke University's School of Medicine, focused a portion of her presentation on the role of leadership and what constitutes good leadership. Dean Klotman emphasized to us how at the beginning of her career she did not set out to become a leader, however, there were instances when she would "sit around a table and hear things, and think, 'I could do it better.' " Due to this belief, she found herself seeking out roles of leadership. This sentiment hit close to home for me, and I am sure for other Huang Fellows as well. As we continue our education and aspire to be leaders in various fields, it is important that we interact with, and, importantly learn from current leaders. This interaction not only helps us to understand the different components of leadership but also to be selfaware of our personal strengths and weaknesses regarding our own leadership styles.

As a leader, Dean Klotman recently has been confronting the crisis of Covid-19. Dean Klotman believes there are important characteristics of leading through a crisis; some of these attributes include the ability to make quick decisions, be reliable, have the capability to communicate at multiple levels, and be a source of credible information. As Covid-19 surges through different communities, it has become extremely apparent to me how a leader can exacerbate a crisis. Even though Dean Klotman's characteristics of crisis leadership sounds relatively simple, this pandemic has unveiled how certain individuals lack some or many of these qualities. At the same time, sometimes we expect almost perfection from the leaders in our community. This summer I have definitely been guilty of extremely high expectations from the leaders of Duke University regarding plans to return to campus in the fall. The devastation of Covid-19 will eventually end and once it does people will remember those who led with integrity and honesty and those who did not.

In her presentation, Dean Klotman revealed that as a leader she is currently addressing two crises: Covid-19 and systemic racism. Dean Klotman described how the Duke University School of Medicine is in a strategic planning process for efforts related to diversity, equity, inclusion, and anti-racism because she believes "If we can't improve our community, we will have a very little chance of having an impact outside of Duke." Dean Klotman's words remind us of the important work that needs to be done in many institutions in order for them to be more equitable and inclusive. I was surprised and grateful that Dean Klotman used part of her presentation to address the presence of systemic racism and its effects. To me it proved that Dean Klotman not only possesses important attributes of a good leader but also, she serves as an example of a leader to emulate.





### Dr. Sally Kornbluth: Huang Fellows Reflection

Ashley Lo, Class of 2023

Ashley Lo is a sophomore from northern New Jersey interested in studying computer science. She's fascinated by the potential for technology to revolutionize scientific research and how it can be leveraged to solve problems in the health sector. Given the ethical and societal issues that inevitably arise when using artificial intelligence and big data, she believes it's important to carefully weigh the costs of using these tools with the potential insights they provide. As a Huang Fellow, Ashley hopes to explore the potential risks associated with these tools in greater depth and develop a more nuanced understanding of the ethical considerations in science research.

I never expected to feel stressed during a Huang speaker series event, much less a career talk designed to be exploratory in nature. But, listening to Provost Kornbluth's journey from political science major to biology postdoc to Provost was a simultaneously stressful, inspiring, and thought-provoking experience I don't think I'll forget anytime soon.

While recounting her own personal journey, Provost Kornbluth combined meta references to her life's circuitousness with descriptions of actual junctures in her life, emphasizing the sequence of choices that have brought her to where to she is today. What I found most surprising, was that at every potential fork in the road, Provost Kornbluth made choices based solely on what feel right to her, even if it led to decisions based on a whim or directly opposed to what colleagues and family members suggested. Some of the more notable ones included attending Rockefeller instead of MIT for graduate school to avoid taking biophysics and physical chemistry classes with undergrads and leaving an appointment as Vice Provost 3 days in - after her appointment had already been documented in the Chronicle - once realizing it wasn't the right fit for her.

I couldn't help but notice, and Provost Kornbluth lampshaded this herself, how her decision-making process seemed to fly in the face of the reasoning typically associated with science, despite being a scientist by training herself. Even while knowing the ending of Provost Kornbluth's story, I found myself vicariously horrified and awed listening to her descriptions of each decision she made. I couldn't imagine making the same choices with the apparent ease and confidence she did, and trying to do so only proved to be a source of stress. How could someone make decisions so easily, even when they were guided by a whim? How could someone be so relaxed and confident that everything would turn out alright, even when many people around them disagreed with or couldn't understand their decision?

With these questions in mind, I began to reflect on decision-making as a concept, both in general and my own life, in hopes of understanding what prompted this reaction. When understood as motives for action, I've often found that emotions and reason are framed as ends of a binary, distinct poles on a dichotomy of human behavior. Emotion or reason, head vs. heart. While I recognized, intellectually at least, that it was a bit more complicated than that, I still generally thought that choices, especially major ones, made based on a solid foundation of careful deliberation and firm reasoning divorced from emotional impulses, if possible, were best. In a world as unpredictable as ours, we should at least try to wrest control of our own lives, right?

Unfortunately, however, Provost Kornbluth's experiences proved somewhat of a challenge to this mindset, with even the thought of allowing a whim or a vague impression of what felt right to guide my decision-making leaving me unsettled. Deconstructing how choices are made, however, revealed more in common between any given "rational" decision and Provost Kornbluth's more adventurous ones than I would I have expected. While superficially, yes, it appeared that stepping down from a Vice Provost position within 3 days to satisfy a gut feeling was ill-advised and impetuous, the underlying motive was arguably the same as that of any carefully reasoned decision.

Why? Making a "good" decision necessarily requires a working, personal definition of what is desirable. While in some situations, there is almost unanimous agreement about what constitutes a good outcome, in many, the options are just different, not qualitatively (or quantitatively) better or worse. Even if you do make a "logical" decision, it only is so because it furthers a set goals you have decided to pursue, which are ultimately expressions of what you want and aren't always rational. In other words, then, "what feels right" does factor in, whether you're consciously aware of it or not. And, maybe it isn't productive to fixate too much on making the "perfect" decision. After all, you get to decide what perfect is, using vour own feelings.

So, emotion *and* reason, head *and* heart, inextricably, and always.



Dr. Sally Kornbluth addresses the Huang Fellows



# When Your Mind Wanders, Where Does it Go?

**Reflection on Dr. Lefkowitz's Seminar** 

#### Kyla Hunter, Class of 2023

Kyla Hunter is from Princeton, NJ pursuing a major in Mechanical Engineering and a certificate in Energy and Environment. She is interested in the application of technology to environmental issues, and the overall social implications of a changing climate. Technology regarding clean energy alternatives and carbon sequestration hold tremendous potential to address the global environmental crisis. Yet, these solutions must also consider the way in which different populations across the world are so disproportionately impacted by climate change. She someday hopes to contribute to the integration of innovative technology and necessary policy changes to create solutions that align with the concept of environmental justice. On campus, Kyla is involved in Energy Club, Amnesty International, and FEMMES (Females Excelling More in Math, Engineering, and Science).

At The Bronx High School of Science in the 1950s, two friends Steve and Robert contemplated their potential future career interests. Steve had an incredible aptitude for chemistry, and dreamed of pursuing a career of research. Meanwhile, Robert had three personal heroes: the centerfielder for the Yankees, the author of the James Bond novels, and, most significantly, his family's physician. Yet, decades later, Dr. Steven Rudolph had become a practicing physician, and Dr. Robert Lefkowitz received a Nobel Prize in chemistry. A recurring theme in this summer's career talks is echoed through this anecdote told by Dr. Lefkowitz: the path you follow on your academic and professional pursuits will likely not be as straightforward as you think.

From the age of eight, all the way through high school, undergraduate and graduate school, Dr. Lefkowitz was unwavering in his desire to become a practicing physician. It was not until he was 25 years old that external forces, in the form of the Vietnam War, interfered in this path. In 1968, during Dr. Lefkowitz's residency at Columbia Hospital, a mandatory draft on physicians sent him to work for the National Institute of Health. With little mentorship and zero experience in conducting research, Dr. Lefkwitz described his initial experience at the NIH as "brutal." However, 18 months into his two year assignment, his research began to come together. When he left the NIH to continue his residency, he found himself missing the laboratory. Throughout the remainder of his career, Dr. Lefkowitz found himself gravitating more and more towards research, and further from the clinical practice he once pursued.

Making decisions about academic and career pursuits is a daunting task for many young students. Figuring out your greatest passion, and how this aligns with the impact you want to make on the world, is a complicated process. To create room for flexibility, there are some conscious decisions you can make. Most significantly, choose your mentors carefully and take time to explore all of your interests. Seek out individuals that you think could provide useful guidance, and refrain from being in a hurry to get where you think you want to go. While these methods help with discovering new opportunities and keeping an open mind, isolating your true passions often requires deeper self reflection. For Dr. Lefkowitz, the answer lies in paying careful attention to where your mind goes when you allow it to wonder. Upon further consideration, this practice allows for the removal of outside pressures and preconceived notions. Catch yourself daydreaming on car rides, in the shower, or before falling asleep. These occupations represent the ideas that most stimulate your brain, and the problems that most weigh on your conscience.

In summary, Dr. Lefkowitz left us with some fitting parting advice, "if you think you know now exactly where you're going... you don't."





# Health Policy Matters: Huang Fellows Reflection

Judy Zhong, Class of 2023

Judy Zhong is a pre-med student from the suburbs of Philadelphia. She's considering a major in Economics with an I&E certificate. In high school, Judy spent a few years working in a molecular biology lab, but always felt there were issues beyond the science itself that need to be addressed. Currently, she's interested in exploring how biotech startups can be geared more towards social impact through human-centered design. Judy also hopes to investigate the relationship between health policy and patient care at the ground level. At Duke, she's launching an environmental tech startup and is involved in Asian InterVarsity Christian Fellowship and Duke University Union. As a Huang Fellow, Judy hopes to gain a greater understanding of the ethics behind her career plans in the medical field.

When I think of science, I think of people in lab coats handling test tubes of varying sizes. What do I not think of? Policymakers. But in fact, policymakers are researchers of a more nuanced science: the science of implementation.

Director Mark McClellan of the Margolis Center for Health Policy is a master of that science (and many other sciences). Hearing Director McClellan's talk, I realized that the good intentions that underlie healthcare delivery and innovation can still lead to adverse alternative outcomes. Policy is messy, and the path towards improving our healthcare system is never really linear. The tension between patient care and profit continues to persist, even as progress is made. However, not every law can be simply categorized as good or bad. Experts don't know everything and are also learning themselves. Red tape is a killer, but sometimes it is necessary.

But apart from shattering my preconceptions of what it means to work in health policy, Director McClellan's talk also testified to the massive impact that policy has on the general public. He spoke of both our great successes while also addressing our pitfalls in fighting the COVID-19 pandemic. Operation Warp Speed is dramatically shortening the timeline to develop a vaccine, and the RECOVERY Trial in the United Kingdom is investigating other potential treatments at a national level. However, such a trial does not yet exist in the United States.

So while policymakers may not be making all the groundbreaking discoveries in the lab, they do carry the great responsibility of implementing those discoveries. Policy matters. And there is always more to be written.





# "To Boldly Go Where No Man Has Gone Before" A Talk with Dr. Mohamed Noor

#### Paige Kleidermacher, Class of 2023

Paige Kleidermacher is a sophomore from Miami Beach, FL, interested in environmental science and policy as well as economics. She is considering the possibility of a law degree to confront the challenges of environmental science in the context of government and corporate policy. The world faces unprecedented challenges with the threat of climate change along with the depletion of our natural resources. Sustainable business models with policies that encourage innovation of environmentally friendly technologies will be increasingly important. How we communicate these various threats is exceedingly critical: policies and arguments supporting them require precise wording and reliable scientific evidence. Paige is excited to pursue the study and application of those interests in science and public policy as a Huang Fellow.

The first meeting of our summer Huang experience was with Dr. Mohamed Noor. The discussion on science communication was thought provoking, but what resonated with me the most was Dr Noor's unique accomplishments. Dr. Noor, an evolutionary biologist, merged his academic pursuits with pop culture. Noor's study of evolution permeated into his passion for Star Trek. As the science consultant for the Star Trek. As the science consultant for the Star Trek TV franchise and the author of "Live Long and Evolve: What Star Trek Can Teach Us About Evolution, Genetics, and Life on Other Worlds," Noor's involvement with Star Trek is both entertaining and instructive.

Star Trek became a palette through which Noor communicated his scientific beliefs and aspirations. As Huang Fellows, we think critically on science communication and how to best convey our science to broader audiences. I think a valuable lesson can be drawn from Noor's experiences. Communication through unconventional forms can amplify a message and reach individuals who might not otherwise be privy. Dr. Noor's YouTube channel is a prime example of this unconventional communication. His most recent video draws upon the "Vidiian Phage" episode in Star Trek to understand viruses and vaccines. With the current state of affairs, where science is often politicized, communicating science outside of its typical context is exceptionally effective.

On a more personal note, Dr. Noor's presentation inspires me to consider what I want in a future career. While it is cliché to say, "I want to do something I love," this is quite difficult to measure. I want what I am working on, to affect the way I see the world. This is a better indicator that I am on the right path and what I think Noor best exemplifies.



# Steve Nowiki Seminar: Huang Fellows Reflection

Grace Lee, Class of 2023

Grace Lee is a pre-medical student from Atlanta, Georgia, pursuing a Neuroscience major and a Political Science minor. She is fascinated by the inner workings of the brain and about the potential causes of and treatments for neurodegenerative disorders. At Duke, Grace currently works in Dr. Henry Yin's lab studying the basal ganglia and volunteer with organizations including Duke Red Cross, Global Public Health Brigades, and Threshold, an organization that helps people with neurological disorders reintegrate into society. Her dream is to conduct research on Alzbeimer's Disease while working with policy experts to create public health infrastructures that help people with neurological disorders and their families. As a Huang Fellow, Grace wants to learn more about the social and ethical implications of her research and about how to take an active role in the translation of research into policy.

Scientists dedicate their lives to asking questions, crafting theories, and finding answers. They do so through careful observation and thought, often spending decades studying a single concept. So what should a scientist do if he/she finds a blind spot, an idea that no one had thought to explore, in the fundamental tenants of his life's work? Dr. Stephen Nowicki was confronted with this dilemma when he found himself recognizing the unsubstantiated assumptions that governed his field. Dr. Nowicki's seminar revealed the principles of research integrity and ultimately asked questions about the development of scientific theory: does science progress through collaboration, conflict, or both?

"We were wrong! We realized that we'd messed the whole theory up." Dr. Nowicki began his presentation with this declaration before delving into the traditional model of animal color perception, citing the example of female zebra finches, who preferred male finches with red beaks when selecting mates. This predilection was a result of the fact that red beaks were often an indicator of stronger immune systems, since red beaks indicated a

greater ability to gather and metabolically process carotenoids, a pigment involved in both coloration and the immune system. Substantial research had been conducted about why the red beak was attractive, but throughout the decades, a singularly important question was ignored: how do females perceive these male beaks? The accepted theory was that females saw the color of these beaks on a continuous scale – the redder the beak, the greater the fitness of the male. Researchers in the community assumed that humans, for the purpose of discerning complex speech sounds, were the only animals capable of categorical perception. Following this belief, they neglected to see the male zebra finches from the lens of a female zebra finch, instead assuming that she must perceive the color of the beaks continuously. Recognizing this gap in perspective, Dr. Nowicki conducted experiments to try and see the males from the eyes of a female zebra finch, and his research ultimately led him to disprove the longstanding theory of continuous color perception. He found that the females perceived the color of male beaks categorically, meaning that until a certain threshold, the subtle differences in

beak shades meant little to females when considering male fitness and thus when choosing mates.

Dr. Nowicki's conclusion contradicted established theory and previous findings, including his own. He, however, continued to conduct research in support of his theory of categorical color perception. His actions reveal the importance of honesty in research: though publishing new findings and pursuing new models can potentially disrupt a branch of study and lead to temporary chaos, doing so allows researchers to challenge their own assumptions, ask new questions, and progress science. If not for this process, we would probably still think that the Sun revolves around the Earth.

Dr. Nowicki's lecture taught me to be introspective and acknowledge my own biases. In society, biases can lead to systemic injustice and result in the discriminatory treatment of an entire group of people. In science, these biases can cloud our perceptions of results when trying to form an explanation of our observations, leading to inaccurate conclusions that can fundamentally shift and even set back an entire field of work. His lecture taught me to think about the inherent assumptions in my life and in my own research and to ask guestions, never taking a claim at face value. Even with the recognition of our own biases, however, completely eliminating our predispositions may be impossible.

The idea that we can never shake our assumptions seems to paint a bleak picture for the future of research. But Dr. Nowicki left us with the idea that perhaps assumptions shouldn't only be acknowledged but embraced as well. Through collaboration, people of different backgrounds and thus different perspectives can come together, allowing scientists to learn new approaches that they hadn't previously considered through argument and discussion. And from these arguments, new ideas in both science and society are born.

Dr. Nowicki's success is a testament to the importance of asking questions and challenging old ideas. Like the development of the careers of many of the speakers, including Dr. Nowicki's, the growth of science is not linear. As Dr. Nowicki puts best, "when you start asking a question, you never know where it will go and what you might need to do to get closer to the answer." The process of reaching a conclusion involves unexpected findings, obstacles to interpretation, and the discovery of concepts that you didn't even know that you didn't know. And the discovery of these concepts is often the result of intense debate with others and the appearance of seemingly conflicting observations. As researchers and as people, we must ask questions and challenge long-established theories to push science and society forward, develop new models, and revise previous conclusions. The process of learning involves both collaboration and conflict, and it's ultimately through the new ideas born from this arduous process that science grows.



#### Our Crazy, Connected World: What's at stake in the era of social media and how do we adapt to these new concerns?

Andrew Y. Liu, Class of 2023

Andrew Y. Liu is a Pratt student from Cleveland, OH, boping to major in Biomedical Engineering and minor in Philosophy. Volunteering at Care Alliance, a local bospital that provides free medical care to bomeless people, be was inspired to pursue medicine to belp improve the lives of people who were powerless to affect their health. At the same time, Andrew was involved in structure-based drug design research at the Cleveland Clinic. This confluence of experiences led to bis goal of becoming a physician-scientist, a position that will allow me to simultaneously innovate medical care while applying novel remedies. The interface of new drugs and treatment is a societal question, and he hopes that being a Huang Fellow will equip him with the critical skills required to meet these demands. Ultimately, Andrew hopes to tie research and care together to broaden the range of available treatments and expand the scope of access to medical care.

One of the defining characteristics of Generation Z, the cohort that our Huang Fellows class belongs to, is our upbringing surrounded by various forms of technology. This includes devices that have made our lives filled with greater access to information and convenience such as the Internet and social media. Yet another feature of our generation is our exposure to a constantly militarized post-9/11 America. With the War on Terror being older than many of us, ideals that remain at the core of our Constitution, like privacy, are increasingly foreign to us. This context made for a particularly engaging discussion that our Huang Fellows class engaged in with Prof. Matt Perault.

Prof. Perault is currently the Director of the Center on Science and Technology Policy having originally come from Facebook as their director of public policy. With this background connected to a social media giant, Prof. Perault provides an immensely valuable perspective from the private sector. In particular, Prof. Perault was primarily involved in foreign markets, such as China, making his knowledge relevant to the growth of Chinese social media abroad.

From the get-go, we already knew this discussion with Prof. Perault was going to be different from many of our past seminars. Rather than begin with a presentation to load us with a concentrated overview of social media, the floor (of the Zoom call?) was instantly open to questions. Right away, complex topics relating to data privacy over popular Chinese social media app, TikTok, were fielded. While our news is constantly filled with information on the potential for TikTok's ban, the insight of a private sector expert in global technology policy helped us understand what TikTok's future business strategy will look like. In fact, what I found interesting was how TikTok's parent company, ByteDance, is likely shifting TikTok from its Chinese origins to the American market since it also controls the separate yet analogous Douyin app. This allows ByteDance to "distance" its TikTok app from China yet maintain market share through Douvin.

In addition to our immediately relevant discussion regarding TikTok in America, our topics shifted to tackle a broader range of topics. Whether it's fake news on social media and how it should be policed, data privacy in the age of the PATRIOT Act, or even the pros and cons of online classes, there was one message that I believe unified our overall seminar. Many of the problems we are tackling that relate to the growth of social media are unique issues that past governments, corporations, and even generations of people have never needed to address. As a result, our latest cohort, Generation Z, must be prepared to shape future technology policy in a way that optimally balances the harms and benefits of our digitally connected world. At stake are entire industries and ideals.



# Duke SANFORD SCHOOL OF PUBLIC POLICY

Professor Perault is the Director of the Center on Science and Technology Policy at Duke University, and a former Public Policy Director at Facebook



# Podcast Workshop: Huang Fellows Reflection

Nikhil Gadiraju, Class of 2023

Nikhil Gadiraju is a sophomore from Apex, NC, majoring in Biomedical Engineering. His scientific passion lies in understanding the implications of engineering and technology in the field of neuroscience and medicine. The brain is what allows us to perceive the world around us, however with the advancement of artificial intelligence and brain-machine interfaces, truly quantifying and understanding the brain is vital. He is interested in better understanding how our brain can interact with the technology-driven world around us and how we can utilize this brain-machine connection to belp treat neurodegenerative maladies such as Alzbeimer's and Parkinson's and solve mental health issues plaguing the current world. As a Huang fellow, Nikhil is eager to better understand the ethical implications of interfacing with the organ that drives our perceptions, consciousness, emotions, and ability to live in the environment around us. As an aspiring physician/neurosurgeon, he is excited to have deeper conversations about the impact of science in the context of service to society. Outside of academics and research, Nikhil enjoys playing ultimate Frisbee with Duke Brimstone and volunteering in bis local community.

As someone who spends a majority of their free time with headphones on and music playing in the background, the idea of developing a podcast seemed like more than an assignment. It's always any audiophiles dream to use tools and instruments to create seemingly elegant noises and sounds that we define as "music"; In this case, however, the instrument was our voice. Before this seminar, the thought of listening to a podcast lacked in my consciousness. In fact, the extent to which I understood podcasts ended at the word itself – this void in knowledge would quickly be filled.

Ben began his presentation by discussing the various aspects that comprise a successful podcast, two of which were "good storytelling" and "interviewing". However, much to my surprise, the list didn't end here, but continued to include exceptional audio, fitting music, and pacing. Initially, I was a bit surprised that considerations as simple as audio quality were approached with such vitality. Similarly, I always assumed that fitting music was simply

needed to block out awkward silences. These assumptions were quickly disproven as Ben explained how these factors help lead the audience through the discussion and ensure clarity and engagement from the listener. After talking briefly about the composition of a podcast and the small details involved in elegantly crafting one's voice, he then began to discuss a topic that typically left me anxious and worried: interviews. At this point, the daunting Huang fellows interview still lingered in my head and the lost and confused feeling I experienced in that interview room all came rushing back. But, luckily, Ben was going to talk about hosting interviews rather than being the victim of one. In addressing this topic, he mentioned creative ways of recording and hosting an interview: positioning the microphone off axis from the subject's mouth, asking open ended question, and even going against your impulse and asking your guest to repeat themselves. At this point it struck me. Compared to a typical interview that is centered around the interviewer and interviewee,

in this case, we need to consider a third factor: the audience. In a podcast, your ability to both communicate your thoughts and interact with your interviewee is overshadowed by the need to ensure your audience is being engaged. I recognized that even if you are having a rich, insightful conversation, it is integral that you make your audience feel present – it should feel like listeners are sitting right next to you weighing in on the conversation. After addressing the nuances of interviews Ben closed by humorously introducing concepts such as vocal fry and upspeak through examples from pop culture. By the end of Ben's talk, I gained a newfound appreciation for podcast creators. Moreover, I learned that the human voice can be used to communicate so many emotions and ideas and there is a myriad of ways to do so. From adding emotional color, to pausing at the right moments, to repeating dialogue, one may change the course of a conversation and its interpretation. More broadly, I understood that to make a podcast or simply record a conversation, it's the seemingly irrelevant details that matter the most. So next time I listen to some music or play an instrument, I'll know that every note can make a difference.

"I learned that the human voice can be used to communicate so many emotions and ideas and there is a myriad of ways to do so. From adding emotional color, to pausing at the right moments, to repeating dialogue, one may change the course of a conversation and its interpretation."



# Science Kits Reflection: Huang Fellows Reflection

Albert Rancu, Class of 2023

Albert Rancu is a sophomore from Clemson, SC, planning to major in biophysics and neuroscience. At Duke, I am currently working in Adam Wax's BIOS lab in the biomedical engineering department. In the future, I think I'd like to pursue a career as a physician-scientist, combining quantitative work with an empathetic profession. Finding the connection between social responsibility and the pursuit of new scientific discoveries is what led me to the Huang Fellowship. I am excited to continue understanding this complex relationship over my next few years at Duke and through this program.

Besides finding this talk interesting, this specific topic is something that's been pretty close to my heart for a while. In high school, I founded an outreach group that conducted afternoon STEM workshops for middle school and elementary school children. The lessons would be written and taught by student volunteers at my school, and we had grown to do small experiments or activities in biology, chemistry, physics, and math. While I found the other talks that I heard intriguing or thought-provoking, this one stood out to me as something that I could compare to a yearslong experience that had left an impression on me already.

I think the largest difference to me between what we talked about and what I did in high school was the structured goal that the schools systems have to obey. It makes total sense; as an institution, they're responsible to deliver a certain level of performance and they have to establish that level for themselves and for others. There's an accountability that you can't expect from a group of twenty-something high school students. The idea of applying a relatively firm structure to the education of such young students made me think. Do we need to impose rigor? What's our goal? Like I've mentioned before, there understandably needs to be some measure by which to judge the effectiveness of the lessons. However, I'd like to ask what's the cost on both student and instructor interest in what they're doing.

In those afternoon lessons, our goal was simple. We were trying to tell a good story and keep the kids engaged in the experiment or activities. Our only hope was that when they left after an hour that they had some sort of new or renewed level of curiosity in science. We weren't particularly worried about their mastery of chemical reactions or understanding of inertia, but rather that they would now have a guiding curiosity in STEM subjects. I think that it should be something to consider when creating lesson guidelines like the ones discussed. Anytime there are lessons plans put out for teachers and students to follow. I think both groups feel pressure from them and this pressure subdues enthusiasm. Most students at that age and even in my class at Duke are guided by their natural curiosity and their exploratory instinct. They won't become more interested if it becomes expected of them to learn a specific subject in a specific way; many might even begin to resent it.

Moreover, our education system's been forced to adjust itself in the past four months. Teachers and students have had to reinvent and re-imagine what a classroom looks like.

There have been fundamental alterations to interactions that are usually considered vital to education and it's only reasonable to expect everyone to continue adapting to the circumstances. Without evidence, I suggest that it makes the most sense that this transition to virtual learning has had the largest impact on the youngest age groups. These students haven't had the experience of a teacher or a class that has shown them where they'd like to direct their interests yet. Students, and especially young students, already experience an inherent amount of stress in finding a suitable way to learn at home with numerous unknown distractions. It's unreasonable to expect them to be completely focused on exploring a natural science and that's before you consider that they do this knowing that they're expected to attain some mastery at the end of the process.

That being said, I think the present conditions should be used to reform how we think

about schools and their lesson plans, specifically at the earlier stages like the kind that we aim to reach with our science kits. There needs to be a moment where we consider whether methodical structure and expectation is the best way to encourage long term study in any field. I freely acknowledge that there are many headaches and logistical issues in the delivery of education at any level that I can't appreciate. This has been a personal opinion and a reflection in the truest sense of the word on what I feel like are things we should rethink in how we educate students. That being said, our system is designed with an emphasis on mastery rather then emphasizing loose, independent exploration that doesn't feel forced. I firmly believe that if the goal of education at young ages and even later on is to produce capable individuals who depend on their skills in the discovery of the unknown, then we fail these students by pressuring them to focus on a result rather than on a process that inspires a passion.



Photo from the 2018 Huang Fellows Science Kit Project



# Storytelling in Science: Huang Fellows Reflection

Eileen Wen, Class of 2023

Eileen Wen is a Trinity student from Falls Church, VA, pursuing majors in neuroscience and computer science with a certificate in Science & Society. Neuroscience draws her with both its known complexities and challenging mysteries. Eileen saw these up close through performing biocomputational research in Alzheimer's disease, an experience that piqued my interest in studying the molecular mechanisms underlying neurodegeneration to find avenues for therapeutic intervention. While she has always been fascinated by science and basic science research, Eileen has a newfound passion for bridging knowledge learned in classrooms and lab work to their broader social contexts. Through recent Science & Society coursework, she studied ethical questions in genomics, explored intersections between media and mental health, and researched the role of science communication in shaping the legislative vote on science research funding. All of these academic experiences reinforced her appreciation for utilizing the humanities to enrich my scientific understanding. As a Huang fellow and aspiring physician, Eileen is excited to navigate even further how to best utilize science to serve society.

From finding non-clinical interventions for improving health to exploring the female etiology of Alzheimer's disease, the projects the Huang fellows took on this past summer represent not only the vast diversity of current scientific innovation, but also the interdisciplinary nature of how science is evolving. In the final week of our program, I was excited to finally hear the innovative work the Huang Fellows achieved as we each shared our research projects in the creative, storytelling format of a TED Talk.

During the TED Talks, I was illuminated by the vast diversity of science innovation. I listened to my peers share their experiences on researching baboons to inform human behavior, utilizing artificial intelligence to drive the healthcare field, and answering challenges of cultural literacy in patient-doctor interactions—topics I would otherwise not have tapped into on my own. A project on employing data embedding models for historical analysis left me amazed at how science and the humanities are increasingly collaborating to drive both fields forward in an interdisciplinary nature. Despite not being together in person, I could still feel a sense of community and support through the screen, ending each talk with virtual applause and messages of congratulations as we connected through our collective passion for science.

While our speeches were centered on the research project we took on, I also walked away from each with a broader understanding of the social issues the science was addressing. A project on the effect of antidepressants in obesity left me thinking about issues in body confidence while an exploration of Chinese health aid encouraged me to think deeper about the value of trust, transparency, and the value of international partnerships in achieving global goals. These were reminders that our individual projects in scientific research function in context of larger, social implications. While it is easy to be caught up in the technicalities of formulas, test tubes, and datasets, I realized that as researchers it is critical to always remember the social issues that drive our questions in the lab.

Each Huang Fellow's story was ultimately a reminder that our innovations in science are done in service of society, which is why we must also effectively communicate it to share its value. A key lesson I learned as a Fellow is that we are the most powerful advocates for ourselves and the science we care about. While we can achieve innovation as scientists, none of it will truly be impactful unless we share it on a platform beyond the walls of our labs. This is the power of storytelling and effective science communication, the ability to not only share the knowledge we gained, but also do it in a manner that invites others to be engaged as well. The value of communicating science is especially potent in an age where science is increasingly politicized, and the dissemination and continuation of science research rests on the ability to reach nonexpert audiences, whether it may be policymakers or the general public.

As the TED talks concluded our summer as Huang Fellows, I reflected on how much I learned about the vast diversity in which science can be employed, the importance of sharing our science, and the most effective ways to do so. These lessons on understanding research from a holistic perspective, from the research questions themselves to the complex social systems they operate in, are ones I will certainly carry with me throughout the rest of my Duke experience and my future path as a scientist.



*Eileen Wen delivers her virtual Ted Talk on the genetic factors that contribute to healthy aging, life expectancy and disease outcomes.* 



# **Tiger Mayhem?** More Like Tiger Paradise

Madison Griffin, Class of 2023

Madison Griffin is a sophomore from Durham, NC, planning to study Biological Sciences. While working in the Poulsen Ecology Lab, she discovered a passion for research and conservation science. Madison is eager to develop skills in environmental policy, ethics, and writing. Further, she is interested in studying the relationship between arts education and its impact in fostering divergent thinking in young students that can be applied to scientific fields. She was first introduced to her passion for education through the Knowledge in the Service of Society FOCUS cluster, and she hopes to continue to explore this as a Huang Fellow by analyzing this relationship between art and scientific knowledge (STEAM). Outside of the classroom, Madison is interested in choral music and music theory and is looking forward to using this passion to develop ber interests in STEAM as a Huang Fellow.

As the world came to a startling and abrupt halt, and everyone was sent a home with nothing to do, the lives of Joe Exotic, Carole Baskin, and the world of tigers, exotic pets, and roadside zoos took the world by storm. Netflix Documentary Tiger King: Murder, Mayhem, and Madness illuminates the striking differences between roadside zoos and animal sanctuaries. Though the stories of Carole Baskin and Joe Exotic may be dramatized for viewer appeal, forty minutes from campus in Pittsboro, North Carolina, the team at Carolina Tiger Rescue rescue big cats from roadside zoos all over the United States and gives them the treatment that they deserve.

In our virtual tour of the Carolina Tiger Rescue, Katie Cannon, the Education Director of Carolina Tiger Rescue, took us through their 67 acres of land, home to 50 animals from 10 different species, including tigers, lions, leopards, and bobcats. Though this tour was virtual, these tigers did not fail to put on a show. Their vibrant personalities shined through the video as you could hear them purr and rub against the fence to interact with Katie. I've been a cat person since I was a kid, and to learn about where these cats come from, hear their stories, and learn fun facts about them that I would have never known before was a dream come true. Interestingly, the function of a sanctuary differs from the function of zoos in many ways. This rescue is a nonprofit organization, and they do not buy, sell, or even breed animals. Zoos also have a policy where they cannot take in rescues due to potential health or behavioral issues.

After the tour was finished, and as an avid Tiger King fan myself, I had to ask: how did Tiger King affect the perception of tiger sanctuaries? Did the craziness of murder investigations distract from the real message of the show and the horrors of roadside zoos? Thankfully, Katie reassured me that this documentary actually helped their rescue. It brought more people in asking questions, wanting to donate to more nonprofit organizations that put the tiger's best interest at heart. Though I too was sucked into the crazy twists and turns of the documentary, I did notice the blatant disregard for tiger care, and was left pondering what a safe environment for big cats looked like. Luckily, a perfect example lies

just outside my hometown and has been setting an impeccable example for the treatment that big cats deserve.

Though the tour amazed me with exciting facts about lions and tigers, what struck out to me most was the level of care and respect shown to these animals. Most of the animals were saved from roadside zoos, like the infamous Oklahoma zoo run by Joe Exotic, where the animals are too often mistreated, cramped, malnourished, and bred for petting zoos. The Carolina Tiger Rescue is the opposite of that. They have a strict "no-breeding" policy and have taken countless cats under their wing that have often been unprotected by the law. I took this tour as a call to action. As a scientist who is interested in biology, animal behavior, ecology, and conservation, I was left thinking about how I can advocate for these animals when they don't have a voice to fight for themselves and how I can hold myself accountable when researching animals to ensure that my work is ethical. The Carolina Tiger Rescue does just that. Through education, advocacy, and proper care in a sanctuary, the Carolina Tiger Rescue gives these cats a better life.



The 2017 Huang Fellows visit to the Carolina Tiger Rescue



# **Professor Buz Waitzkin:** Huang Fellows Reflection

Madison Griffin, Class of 2023

Hannah Shuffer is from Cleveland, Ohio, majoring in Chemistry and Cultural Anthropology. Her desire is to become a physician that works in an underserved area. Hannah is enthralled with all of the possibilities that the field of medicine has to offer. Currently, she enjoys participating in Best Buddies, Duke Synapse, Blue Devils vs. Cancer and Duke PAWS. Hannah believes that the Huang Fellows program will act as a firm foundation to learn more about both ber scientific interests and the role that she can play in effectively serving others.

One of the reasons why the Huang Fellows program appealed to me was that it would allow me to learn more about the intersection of ethics and the law. This interest was piqued in one of my seminar classes from first semester in which, after reading William Shakespeare's The Merchant of Venice, we discussed the meaning of mercy, justice, and the law. Listening to each of my peer's understandings of those words left me with more questions, the law serves the people. Thus, when I read through the pre-readings for Professor Buz Waitzkin's seminar, I looked forward to how he would present these issues.

One of the seminar's readings was an excerpt from the federal supreme court's ruling for the Gonzales v. Oregon case. It was ruled that it is constitutional for states to define their standards of medical practice(like legalizing assisted suicide). Professor Waitzkin used the case to discuss federalism and utilized the most identifiable example—COVID19. With the pandemic, each State has responded differently, with some staying closed while others have reopened. Through various questions, Professor Waitzkin taught us new concepts and left us more curious than when the seminar started.

Understanding how the law affects our future careers at a deeper level is essential, as was highlighted in the second reading. The

reading consisted of a hypothetical scenario in which a 19-year-old patient requested to be tested for Huntington's disease. While the physician received results stating that the patient is negative for the disease, the results also showed that the patient's stated father is not her biological father. Furthermore, she has a high chance of getting a slew of other life-threatening illnesses. I was surprised when I heard other people assert that the physician should inform the patient of all the results without asking for permission. Comments on duty, "wrongness," and surprisingly, "I would want to know" all came into play. Swiftly, Professor Waitzkin brought up patient's autonomy and how while there's no "correct" answer, it is crucial to look beyond what our preferences are.

To conclude the seminar, Professor Waitzkin gave us a brief overview of how he ended up with the Science & Society program at Duke. A common theme amongst our presenters has been that their paths were not linear, and Professor Waitzkin is not an exception. Consistently, Professor Waitzkin has followed his passions and allowed his concern for others to guide his work and actions, which I would like to emulate in my career path. Through his stories and insightful questions, Professor Waitzkin reminded me of how achievable it is to pursue my passion for science and service.



# **Dr. Jory Weintraub:** Huang Fellows Reflection

Wyatt Focht, Class of 2023

Wyatt Focht is a sophomore from Naples, Florida. Over the course of his four years at Duke, he plans to pursue a B.S.E. in Electrical & Computer Engineering, a B.S. in Computer Science, and a minor in Math. He is interested in various fields within computer science, such as machine learning and artificial intelligence, and their potential future applications towards solving the pressing problems of which are facing the coming age of humanity. At Duke, Wyatt is the Director of Technology and Communication for Engineering Student Government and a member of the software team for Duke Applied Machine Learning Group. As a Huang Fellow, he hopes to refine his interests and knowledge by connecting with a community of similarly-driven individuals and gleaning advice from those with more experience than him.

My diction was deliberate, my prose was precise, and my verbs were—well, verbose: I was ready to debate. But, this was no ordinary debate. If I were to succeed in my endeavors in that very moment, I would prove to my family once and for all...that my brother should not be allowed to take my car to the beach that night.

The evidence was in my favor, the keys were in my hands (both metaphorically and literally), and I even got my palms read the day before, so I was feeling lucky.

But it was peculiar. Regardless of the impregnable defense that I presented, it seemed almost as if they just didn't want to hear it that no matter how much information I provided, they were resigned to say, "Wyatt, just let Rex have the car tonight." And I know what you're thinking: "Wow, weird name" (his, not mine).

However, in trivial situations, such as the one I described above, the stakes are low. There are no real consequences to the rejection of the "argument" that I presented, nor are there any future implications to the outcome of the night. But, when it comes to the acceptance of science, there are always further implications. This exact phenomenon was one of the many topics of discussion that the 2023 cohort of the Huang Fellows had the pleasure of examining with Dr. Weintraub.

During this discussion, Dr. Weintraub presented findings from a study that detailed different groups' sentiment towards new information pertaining to certain scientific claims. The shocking results of this study elucidated a distinct divergence in acceptance of new information between groups of test subjects, upon being presented with the same information.

Though the criteria that defined the composition of the groups would vary from issue to issue, one particular example can be seen in the following graph:



This brings up the question: if different groups of people react differently to the same information, how does one go about presenting science in such a way that more of the populous is willing to consume it? The answer: carefully.

In deliberating upon the direction of where I could take this reflection from this point on, I considered the route of going down the list and describing the different methods that exist to properly communicate one's scientific findings effectively to a large audience. But, I imagine such a description would look dangerously verbatim to Dr. Weintraub's talk, and I would hate for someone to get that talk without also getting to see the fabulous Power-Point that Dr. Weintraub prepared to go with it. So, instead, I plan to take an alternative route and discuss what stood out to me the most throughout this talk: human divisiveness.

More specifically: the almost-inherent divisiveness that exists when large groups of people form. Sometimes, it seems that even when an incontestable opinion arises, there will always be those that disagree. This is a problem, especially when decisions need to be made. Interestingly enough, so much arguing can bubble up from this decision-making that, eventually, some people forget that they're supposed to be arguing for what's right or what's wrong, so they instead argue for the sole purpose of wanting to be correct—a dangerous trait. And upon further inspection, I imagine not many would disagree if I were to purport that a large portion of the voices that we hear going back and forth are there only to serve the interests of the people who are producing them.

So, if I were to attempt to venture into Dr. Weintraub's territory: if you think you have something important to say, and you plan to say it, cater to the audience of people that you are trying to affect and embrace the fact that perhaps the audience, initially, doesn't want to hear what you have to say.

But no matter what, at the end of the day, there will always be those who hold opinions so contrary to the majority's that it makes the common man wonder. For instance, incredibly enough, there are actually still those out there who believe that UNC is a better school than Duke, a perfect example of the extent to which people are willing to distort reality in order to support a *completely, unfounded* opinion.

"For though they may be parted, there is still a chance that they will see...

There will be an answer."

-Paul McCartney



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