Research Symposium 2021

In an ordinary year, Research is difficult.
In this …extraordinary year, Research was a test of the scientific spirit.

Competitions were canceled, and projects had to be adapted to be done at home.

Students, instead of bacteria, inhabited their private petri dishes in the Research Center.

Sleep schedules were abandoned, and the Research coffee maker and mugs sat unused.

But, the students persevered, and science happened!

In the following slides, you will find abstracts for all our 2020-2021 projects as well as YouTube links to many student presentations including those of our beloved baker's dozen of seniors.

Enjoy!

Allyson Weseley

JUNIORS

Luke Christenson

People often gauge their interest in a scientific article based on what they read in the abstract. In student research competitions, abstracts are likely to play a similar role. This project looked at what characteristics of abstracts are related to a student researcher succeeding in competition.Python was used to gather over 8000 publicly available student research abstracts from the Society for Science website along with whether or not the students won a grand award at the International Science and Engineering Fair (ISEF). These data were then analyzed using the Linguistic Inquiry and Word Count, a program that quantifies the amounts of analytical, confident, emotional, and authentic speech in the abstract.A logistic regression showed that abstracts that contained high levels of analytical, confident, and authentic speech were more likely to win an award, while levels of emotional speech were not related to competition success. While students are judged on far more than their abstracts, the results suggest that students who are analytical, confident, and authentic will likely be more successful than those who are lacking in those areas. Students who focus on maintaining objectivity as opposed to being emotional in their writing will often experience greater degrees of success than the latter.

Owen Edelstein

Proteins are a key biological component that perform essential life processes, however, mutations can alter their function and possibly cause harm to the cell, such as cancer (Safari-Alighiarloo et al., 2014 HBOC Society, n.d). Pancreatic adenocarcinoma is a dangerous form of cancer with a low prognosis and high mortality rate (Vareedayah, Alka-ade, and Taylor, 2018). Recently, researchers have used machine learning models with biological datasets as a prediction and identification tool (Camacho et al., 2018). In this study, the machine learning models, random forest classifier (RF) and complement naive bayes (CNB), were trained and used as prediction tools with PPI network datasets generated on the application, Cytoscape, to predict proteins that can cause pancreatic adenocarcinoma. In addition, a PCA was run to combine the data into 11 principal components and to analyze the differences between interactions containing and not containing pancreatic adenocarcinoma-causing proteins. The accuracy of CNB was about 88 percent and the accuracy of RF was about 96 percent. However, neither model had good accuracy in terms of identifying protein interactions involving pancreatic adenocarcinoma-causing proteins with f1-scores of 0.35 and 0.24. The RF model successfully predicted 4 novel proteins linked to pancreatic adenocarcinoma, while the CNB model predicted 173 novel proteins. More training is required for the machine learning models to more accurately predict proteins linked to pancreatic adenocarcinoma.

https://youtu.be/Latfzkafwtc

Lindsay Fabricant

With the development of soft robotics, robots are no longer only rigid and stiff—they are now flexible, lightweight, and smooth, both in their texture and mobility. Soft robotic grippers are a growing area of research within soft robotics because of their many applications to society, such as in manufacturing and prosthetics. A current challenge for the developers of soft robotic grippers is improving their flexibility while also maintaining their stiffness and ability to grasp objects of diverse shapes, sizes, and/or weights. Origami has been observed as an application to soft robotic grippers to improve their grasping ability, as it can imitate a skeletal feature. This study explores the application of the “Spirit Bomb” origami design, which is structurally oriented to curl into a ball like a human finger, to a four-fingered pneumatic soft robotic gripper made from accessible and affordable materials. A statistically significant difference was not found between type of gripper or type of object and its grasping ability or time of grasp. However, a statistically significant difference ($p = 0.017$) between type of gripper and pressure suggests that the origami gripper was more effective than the control gripper because it could hold objects of greater weights at a greater pressure. This study demonstrates that the “Spirit Bomb” origami design improved the grasping capability of a soft robotic gripper made of accessible and affordable materials. Therefore, origami can be used to create robots that are made from accessible and affordable materials, which furthers the quest to build cheap, flexible, and lightweight robots for manufacturing settings that are as dextrous as human hands.

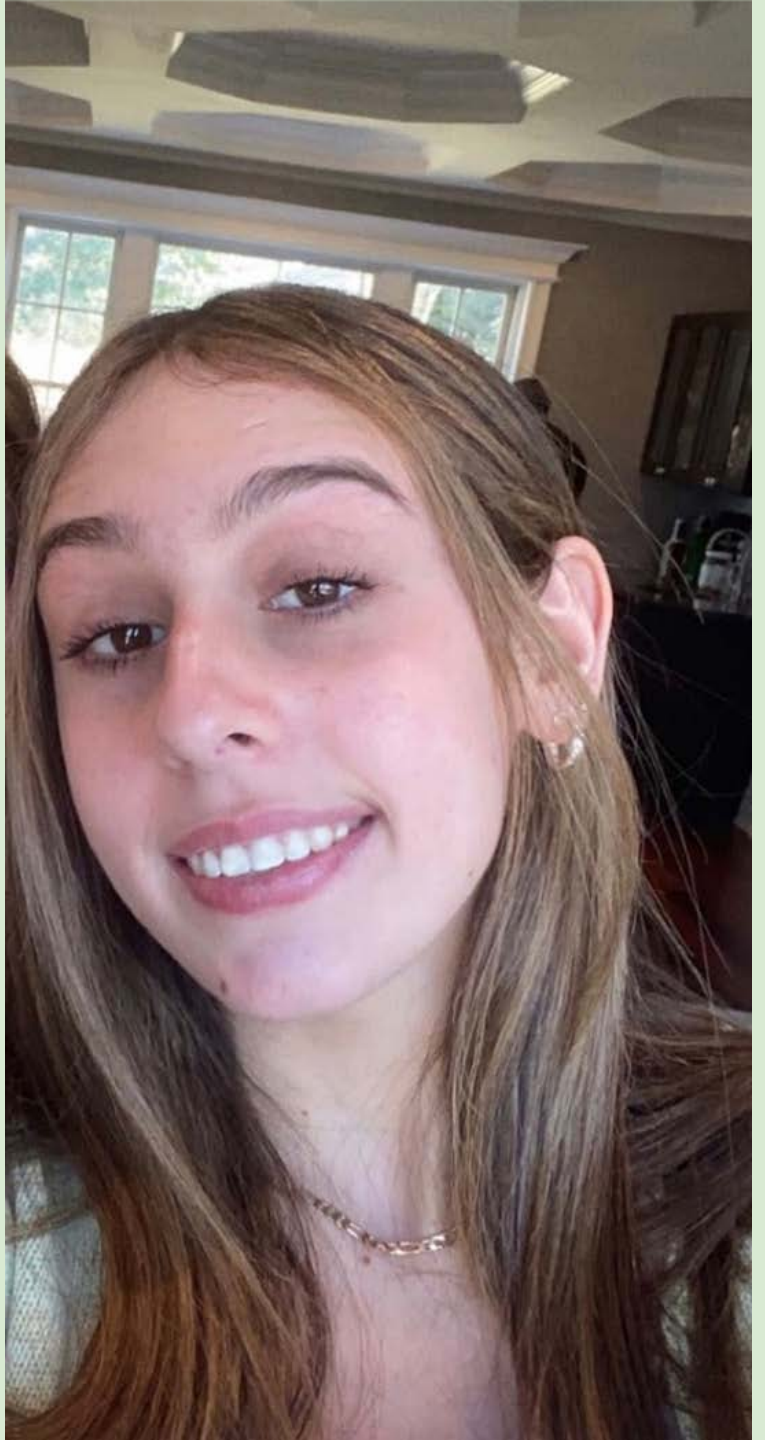
https://youtu.be/_qGY9ZdFTV8

Jaideep Grewal

Telemedicine, the use of online health platforms to conduct virtual clinical visits between doctors and patients, has been heavily researched as it is now commonplace in the health industry, with the market projected to grow immensely in the coming years. However, such practice of medicine has become much more intensive and widespread amid the ongoing COVID-19 pandemic, as a result of which it has become imperative to gauge whether telemedicine can become a viable means of conducting clinical visits both now and in the future. The present study assessed the perceptions of doctors and patients regarding both in-person and virtual visits during the COVID-19 pandemic. Thirty-seven doctors and seventy-seven patients who had participated in clinical visits both in person and virtually during the current pandemic responded to a survey that measured perceived convenience and effectiveness of in-person and virtual visits on 7-point Likert scales. In-person visits were found to have greater perceived effectiveness and convenience for both doctors and patients, indicating that both stakeholders in the healthcare industry do not feel that Telemedicine matches in-person medicine. This study suggests that it is crucial to address the lack of confidence in the current Telemedicine infrastructure, with a particular focus on patient and doctor convenience, in order for Telemedicine to tackle future medical issues that do not necessarily require in-person treatment. As the COVID-19 pandemic continues in its inexorable course, perhaps further spread of the virus can be combated through the use of an improved Telemedicine infrastructure that addresses all non-emergency issues virtually.

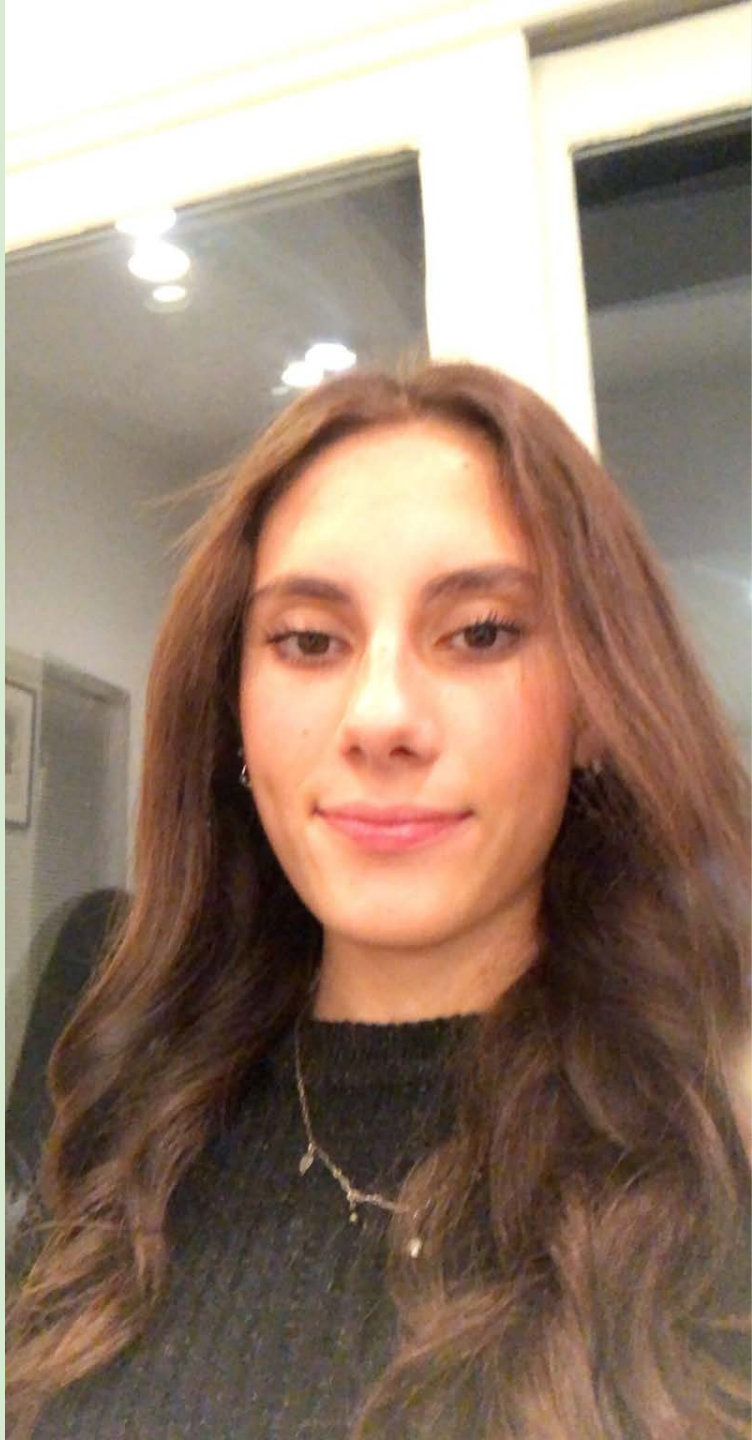
Maya Groothuis

Climate change is an increasing threat to our planet. Most Americans tend to believe in climate change, with 85.6% agreeing with the statement “climate change is caused by both natural processes and human activity” (Whitmarsh et al., 2011). Yet, only one-quarter of U.S. adults say they make an effort to live in ways that help protect the environment “all the time” (Funk & Heffernon, 2019). Environmental self-efficacy (the belief in one’s capability to change the environment and influence pro-environmental behavior) and environmental response-efficacy (a person’s belief that an action will be effective against climate change) have both shown to be associated with higher concern about climate change and stronger support (Bostrom et al. 2018). This study explored the relationships amongst people’s environmental efficacy beliefs and their likelihood of engaging in pro-environmental behavior. One hundred thirty-nine participants were recruited online and surveyed about their likelihood of engaging in pro-environmental behavior, environmental self-efficacy, and environmental response efficacy. Environmental self-efficacy and environmental response-efficacy were both shown to significantly predict likelihood of taking pro-environmental action. The model explained 71% of likelihood of engaging in pro-environmental behavior, and self-efficacy was the stronger predictor of pro-environmental behavior. This study suggests that increasing people’s environmental self and response-efficacy might be associated with an increase in pro-environmental behavior, and that people are more willing to engage in easier actions rather than what they believe are effective actions.



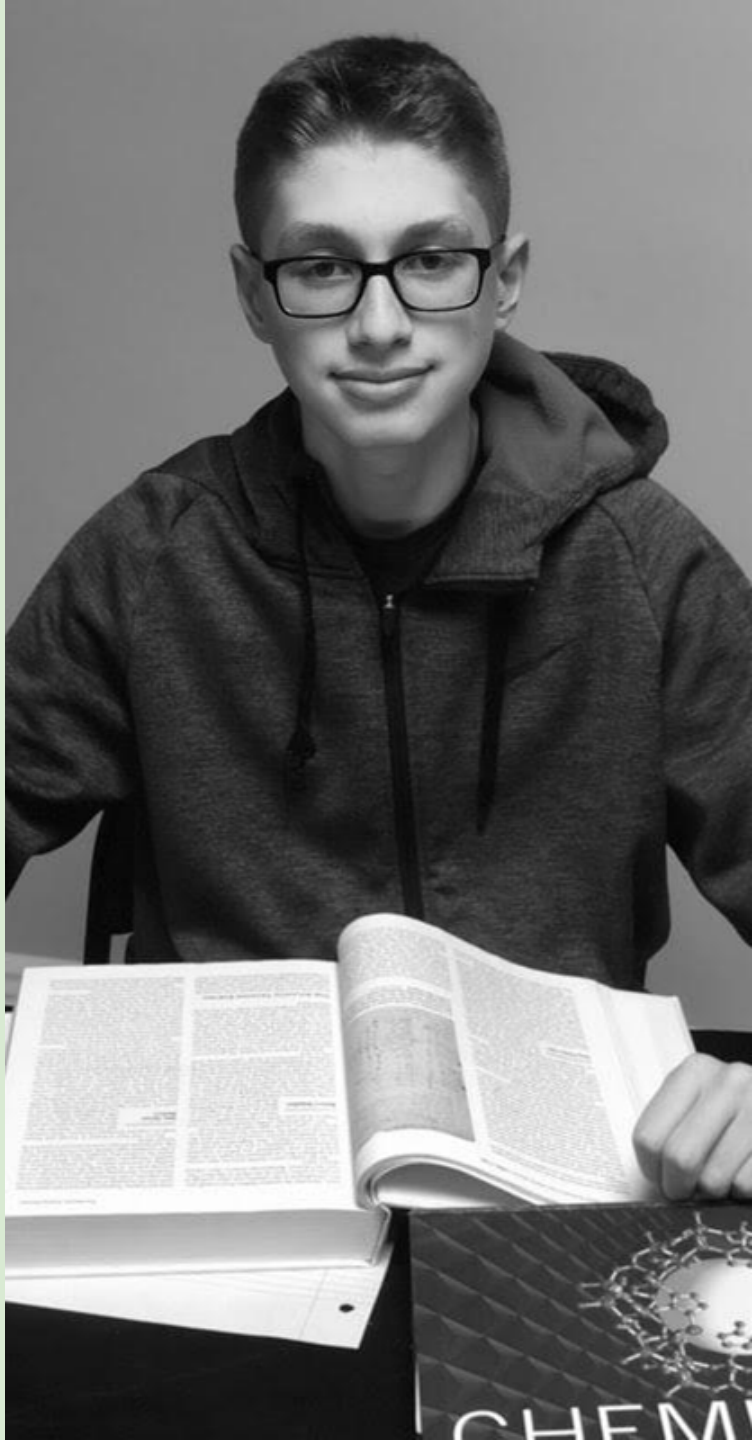
Natalia Hakimi

The Covid-19 vaccine is the key to reaching herd immunity and ending the ongoing pandemic, however, many refuse to receive the vaccine as vaccine messages seem to undermine the successfulness of the vaccine (Kelley, 2021). Many Americans refuse to obtain the vaccine because they fear dangerous side effects and long-term effects as the vaccines are relatively new and were developed faster than other vaccines (Brumfiel, 2021). Additionally, Democrats are fourteen percent more likely than Republicans to say that they would obtain a Covid-19 vaccine (Tyson et al., 2020). This is due to the fact that Democrats are twice as likely to trust scientists as opposed to their Republican counterparts (Tyson et al., 2020). While Democrats tend to trust scientists, Republicans tend to have more positive attitudes towards religious leaders than Democrats (Lipka, 2019). Past literature has also shown that positively framed vaccine messages are deemed more plausible than negatively framed messages (Altay & Mericier, 2020). Previous studies have examined how political party affiliation and framing affect people's intent to receive a vaccine, however, there has not been a study that examined how party affiliation, wording, and source affect people's intent to obtain the Covid-19 vaccine, risk perception of the vaccine, and trust in vaccine information. This study examines these variables and how they interact. Two hundred and three participants were surveyed via Amazon Mechanical Turk and were randomly exposed to one of nine conditions where the wording and source of the information was manipulated with additional positive and negative wording, no additional wording, a religious source, a scientific source, and no source. This study found that people's intent to receive the vaccine was highest when participants read the conditions with additional wording. It was also found that Republicans perceive the vaccine as more risky as opposed to their Democratic counterparts. The results of this study will allow the creation of Covid-19 vaccine messages to be more persuasive as a means of increasing vaccination rates in the US.



Samuel Jacobson

EGCG, which is derived from the green tea plant Camellia Sinensis, is the greatest composition of the plant, at 59%, of any of the tea catechins (Khurshid, Z., Zafar, M. S., Zohaib, S., Najeeb, S., & Naseem, M., 2016). It has been found to be environmentally and human friendly, with not a sign or trace of toxicity (Hsu, 2015). Prior research has analyzed the effect of caffeine on the heart rate of microorganisms such as Daphnia magna, but no study thus far has investigated the effects of EGCG on the physiological rates of Daphnia. The present experiment investigated the effects of EGCG in a powdered form, in a hand sanitizer form, and in a mixture with magnesium oxide particles, on the hopping frequency and heart rate of Daphnia magna. Four cultures were used: one culture for each of the levels of the independent variable, along with a control group used as a source of comparison. Twenty-four Daphnia (six per culture) were randomly separated into each culture, and after ten minutes, the Daphnia were exposed to either EGCG powder-spring water mixture, an EGCG hand sanitizer, or an EGCG and magnesium oxide nanoparticles mixture. The physiological rates of each Daphnia were measured once more after three hours of exposure and then for a final time at six hours. Data analysis through a Univariate Analysis of Variance (ANOVA) and post-hoc tests have revealed a statistically significant increase on Daphnia heart rate with EGCG at all hours studied ($p = 0.000$; $p = 0.000$; $p = 0.000$) and hopping frequency with EGCG at any of the hours measured ($p = 0.000$; $p = 0.000$; $p = 0.001$). Ultimately, this experiment suggests that green tea significantly affects the ability of Daphnia to circulate blood throughout the body and the movement ability of Daphnia in an aquatic environment.



Yasmine Kaplan

While the United States has officially made history with our first female vice president and more women are running for national political offices than at any other time in history, women remain underrepresented at all levels of government (Bauer, 2015a). Many voters do not believe Americans are ready for women candidates to be placed in positions of political power and think it is harder for a woman to win an election. Gender stereotypes about the abilities and traits of women and men in politics could easily serve to shape an individual’s evaluations about the appropriate level and place for women in office (Dolan, 2010). Previous studies focused on the use of gender stereotypes in the context of real-world elections by analyzing data from past U.S. House elections, however, the current study used an experimental design focusing on U.S. mayoral elections since people's preferences for agentic characteristics may be different when looking at local executive offices. The purpose of this study was to explore the effect of adding communal and agentic traits to both male and female mayoral candidates’ campaign advertisements on people’s intention to vote for them. Two hundred eighty eight participants were surveyed via Amazon Mechanical Turk and were randomly exposed to one of the six conditions a male or female candidate described using either agentic, communal or a balanced set of traits. Women were consistently rated highest when they were described as communal while men were consistently rated highest when they were described as balanced. The knowledge from the results of this study will be helpful to candidates as they seek to gain voter support. Both male and female candidates can learn to position themselves better to increase voters’ likelihood to vote for them.

Ethan Kessler

Racial stereotyping is very common in sports. In fact, it has been shown that many American announcers subconsciously craft negative images of Black athletes while on the air (Rada & Wulfemeyer, 2005). In my study, I wanted to examine racial stereotypes of White, Black, Asian, and Latino football and hockey players. While other studies only compared White and Black athletes in one sport, my study added two other races and another sport to compare. Participants (*N* = 237) recruited from Amazon Mechanical Turk, were randomly assigned to view one of eight versions of an experimental stimulus. Each stimulus was a profile for an athlete which included player statistics and manipulated the race of the athlete and the sport he played. After viewing the stimulus, participants answered questions about their perceptions of the athlete's intelligence, strength, and natural ability. Additionally, they answered questions about their familiarity with sports in order to classify them as sports fans or non-sports fans. No significant differences based on race were found with regard to intelligence, strength, and natural ability. However, hockey players had higher perceived intelligence than football players. In addition, sports fans rated players higher in perceived intelligence, strength, and natural ability than non-sports fans did. Overall, the findings were encouraging in suggesting that people may not have as severe stereotypes of athletes based on their race compared to what was initially thought.

https://youtu.be/t8FtgawVucg

Trevor Kim

Anglicizing their names is one effort made by many ethnic minorities to reduce any discrimination and unequal treatment they would have received otherwise. This study examined, specifically for Koreans, whether names on a job application would elicit discrimination and stereotyping. Through Amazon Mechanical Turk, 308 adult participants were randomly assigned to 1 of 8 experimental stimuli. The stimuli were mock job applications and either the applicant’s name or the job they were applying for was altered. The name was either an Anglicized first and last name, an Anglicized first and Asian last name, an Asian first name and Anglicized last name, or an Asian first and Asian last name. The job was altered to be either “computer programmer” or “public relations.” After viewing the stimuli, participants were then asked to rate the applicant's suitability for the job, the applicant’s social skills, and the applicant’s competence. Name was not found to have an effect on perceived applicant suitability, perceived social skills, or perceived competence, but there were significant interactions between the participant’s race and the job the applicant was applying for. For both applicant suitability and social skills, Asian participants rated the job applicant as higher when the applicant was applying for the public relations job. White participants barely varied about these means. However for applicant competence, white participants rated the computer programmer applicants as more competent, and Asian participants rated the public relations applicant as slightly higher. Asian name discrimination within the workplace isn’t as prevalent as expected, and that effort should be placed to expose Asian discrimination in other fields, besides job applications.

Bennett Levine

Since the beginning of 2020, the world has experienced dramatic change. With the ongoing quarantine, the world feels like a simulation. This quarantine, taking a massive toll on everybody, must be studied. This study investigated the emotional and academic effects of the pandemic and quarantine on high school students. In Phase 1 of the study, over 150 high school students were surveyed in the spring of 2020 and the winter of 2021 to investigate their loneliness and stress levels. Girls reported to be more stressed and more lonely than boys in the spring, and their levels of stress were still higher in the following winter. Loneliness between boys and girls leveled out in the winter of 2021 as everyone acclimated to the quarantine. Interestingly, the full remote and hybrid students did not report significantly different levels of stress and loneliness in the winter of 2021. As well as this, both the full remote and hybrid 2021 students were significantly more stressed than the full remote 2020 students. In Phase 2, 30 9th grade students completed 6-item understanding checks following four consecutive lessons on statistics. While hybrid students scored higher on the days they were in school than the days they were at home (73.18 vs. 68.64 respectively), this difference was not statistically significant. In addition, the overall scores of students who were hybrid did not significantly differ from those who were on full remote instructions (70.63 vs 71.57 respectively). Collectively, the results suggest that students are able to adapt and become accustomed to our current circumstances, although it took some adjusting.

https://youtu.be/24P9j3mjhwE

Hailey Marguiles

Research has found that only about half of the population of Americans are complying with the current health recommendations such as wearing masks (Peeples, 2020) and that within this group, men are less likely to wear face masks than women (Elan, 2020). Due to the fact that COVID-19 is fairly new, little research has been conducted on the perceptions of face masks and its relationship to the compliance with current health recommendations, as well as the perceptions of COVID-19. In order to examine the perceptions of facemasks and compliance to CDC health guidelines, one hundred and fifty-five participants were recruited to complete the study via Qualtrics and were randomly assigned to view one of two images which consisted of a man and a woman both with and without masks. Afterwards, they completed five sets of Likert-type scales which measured the perceptions of those who wear masks, masculinity of wearing masks, perceptions of masculinity, perceived fear of COVID-19, and personal behavior in response to COVID-19 which were then followed by demographics. Although the perceived fear of COVID-19 did not correlate with the compliance to health recommendations, the perceived fear of COVID-19 did have an effect on the perceptions of people with and without masks. This study suggests that those who have positive perceptions of those who wear masks are more fearful of COVID-19, implying that mask wearing increases the fear of COVID-19.

Jacob Ramsey

The way that people present themselves while speaking has drastic effects on how they are is perceived by others and how effective they are at conveying their ideas. External voice factors have been shown to convey many complex messages that are not necessarily demonstrated through a speech's content (Schirmer, 2010). Important voice characteristics include the pitch of a speaker's voice and the rate of speech in which they present information. Prior studies on these characteristics have been mixed and conflicting in results, and most have been conducted on the perception of the speaker as a person rather than as a presenter of information. This study sought to find how rate of speech and depth of voice affect the perceived credibility and perceived persuasiveness of the speaker. Three hundred ten participants were assigned randomly to listen to one of ten voice recordings. These differed by the gender of the speaker, the pitch of their voice, and the speed at which they spoke. Participants then answered informational questions about the passage, and two scales measuring the perceived credibility and perceived persuasiveness of the speaker. It was found that a slower rate of speech was perceived to be more persuasive, but there was little effect between rate of speech and perceived credibility. That being said, women were progressively seen as less credible as the rate of speech increased. Furthermore, depth of voice had little effect on persuasiveness, but men were perceived to be more credible than women for all depth conditions. Figuring out the optimal voice characteristics can aid the creation of more effective advertising and public announcements, and using a voice with well-received characteristics allows people to better understand and accept information.

Harshita Sehgal

Low dose emissions of radioactive contaminants have led to disastrous consequences for the organisms living in proximal and distant regions to nuclear accidents, such as ecological problems and health hazards (Bell & Shaw, 2005; Moller & Mousseau, 2011). Interestingly, vegetation has thrived in these areas. Studies have shown that particular herbaceous plant species, such as the Arabidopsis thaliana, have shown evidence of radio-resistance and increased sensitivity as compared with other plants. This project explored the presence or absence of positive selection between branches of orthogroup gene trees and the three species studied (A. thaliana, B. rapa, and B. oleracea) for better understanding the evolutionary significance involved in adaptation to irradiation. The Orthofinder program was downloaded onto the iterm2 software, along with protein-coding FASTA genomes and nucleotide sequences for each of the three sequences. Using background literature review, 12 candidate genes and their functions were studied from Plant Ensemble and ShinyGO, with a final of 7 orthogroups determined for the project. Gene trees were visualized for each of these through IcyTree and EteToolKit. The previously downloaded sequences were aligned using MASCE for codon aware alignments that maintain codon structure. For the analysis, PAML (Phylogenetic Analysis by Maximum Likelihood) was used to run Likelihood Ratio Tests (LRT) on both branch-site models (alternative - bsA1, null - bsA) for each individual branch within the orthogroup. After using the Holm correction for multiple comparisons test to control the Family-Wise Error Rate (FWER), the p-value was significant ($p<0.05$) for the AT2G23050.2 gene within the OG0013135 orthogroup. The concluded beneficial evolutionary positive selection for the AT2G23050.2 gene was significant because it encodes for the NPY4 protein, involved in the ubiquitin protein ligase complex and responsible for the addition of ubiquitin groups onto molecules (Swiss Institute of Bioinformatics, 2021). Ubiquitin groups have several functions such as being a main regulator of protein stability, stress-responsive, and involved in DNA-damage repair as well, which could indicate its role in adaptation mechanisms to radiation discussed before (Brinkmann et al., 2015). As the analyses further, the LRT through PAML will be run on all 7 orthogroups.

https://youtu.be/x_pTOkyKlvA

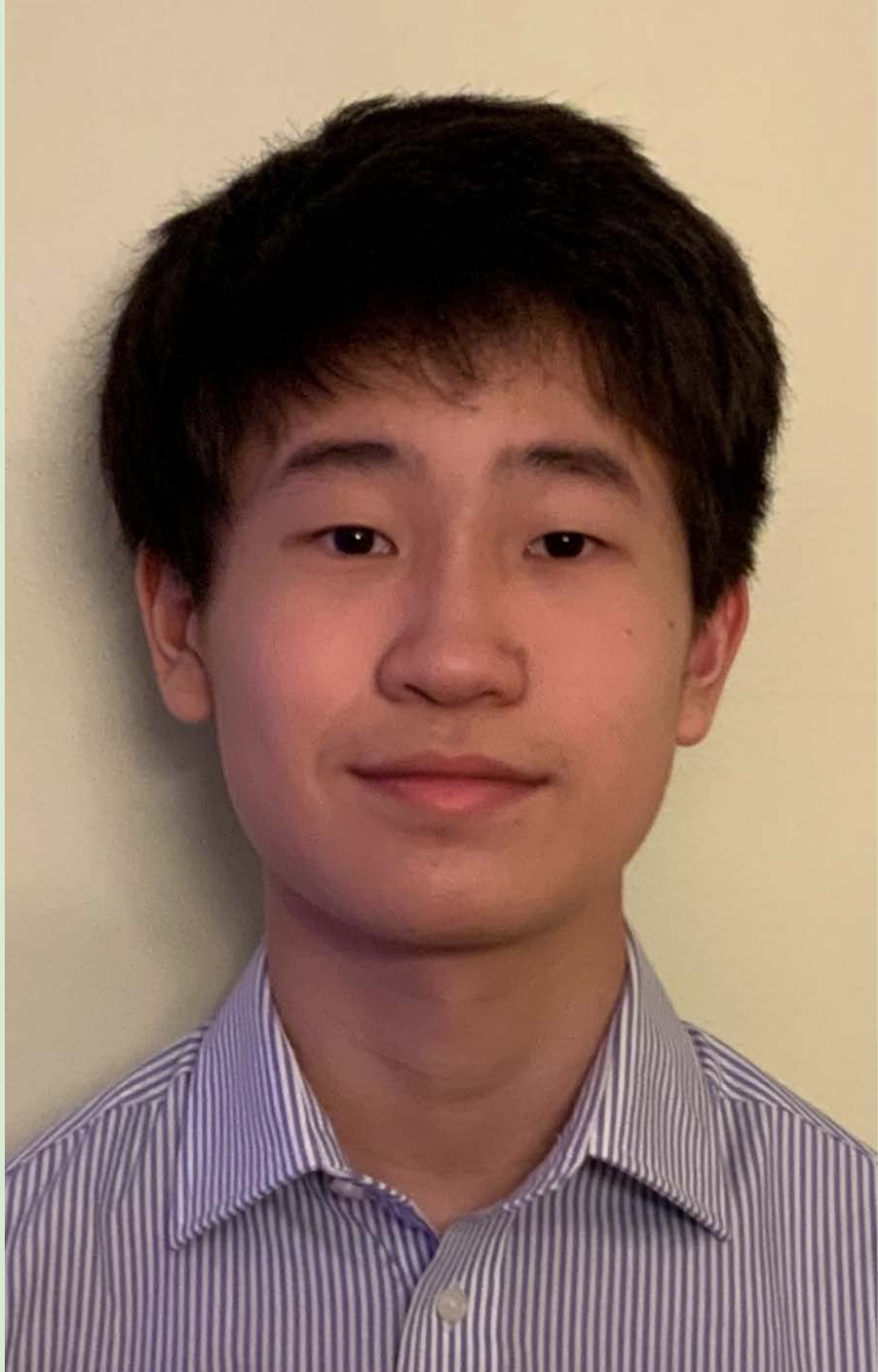
Timothy Wang

Exercise is extremely important for maintaining physical and mental health. Even with that in mind, only about one quarter of adolescents meet daily recommended amounts of physical activity according to the Center for Disease Control (CDC). School is a great place to combat this problem of a lack of physical activity among adolescents because a majority of students get most of their physical activity at school during weekdays. This study examined students' attitudes towards PE and two proposed PE classes. This study also examined the amount and type of physical activity students performed. Students first answered questions about their attitudes towards their current PE class. Students were then also told to imagine both a “free choice” and a “final period” proposed PE class. The “free choice” class would allow students to vote on types of physical activity performed in class. The “final period” class would always be the final period of the day to mitigate the effects of sweating on students throughout the day. Students were then asked to answer questions comparing these two proposed classes to their current PE class. At the end of the survey, students were asked questions assessing the amount of physical activity they were participating in the past week. Boys were shown to perform greater amounts of total physical activity outside of school and during PE compared to girls. Girls also had more negative attitudes towards their current PE classes than boys. Girls also showed more negative attitudes towards the “free choice” PE class. Girls also rated the “final period” class higher, although not significantly, which could mean girls prefer that type of class. Adolescent physical activity, especially among girls, is lackluster and more future proposed PE classes should be studied to examine if attitudes can improve.

https://youtu.be/Or8tUtMtUB8

William Xu

Cancer is the leading cause of death in the world. In order to combat this deadly disease, intensive treatments such as chemotherapy are used. However, these treatments have limitations in their efficacy as well as in their ability to preserve a patient's quality of life. This study sought to research whether chemicals derived from medicinal herbs could combat cancer effectively while minimizing negative side effects. Ganodermic Acid A and Cordycepin were tested in varying concentrations to explore their effects on cell viability and cell migration. The results showed that both chemicals significantly lowered cell viability and cell migration. This suggests that Ganodermic Acid A and Cordycepin show potential as cancer treatments. Through further research, these chemicals can open a gateway to more effective cancer treatments that also have minimal side effects.



Emily Yeh

Genetically modified organisms help provide more food for the growing world population and reduce pesticide use; however, research has also found that many people fear GM technology, despite scientists agreeing that it is safe (Public opinion about genetically modified foods, 2016). The present study examined the effect of GMOs and non-GMOs, product type, and product uses on the willingness to consume a product. Participants (n=295) recruited online were randomly assigned to view an advertisement for a product (rice, chicken, or vitamin), and this product was either described as non-GMO or GMO. In addition, the advertisements for the rice conditions also had either an added vitamin B component or no added vitamin B. When analyzing the data, it was split into two phases in which phase one only looked at the four rice conditions while phase two compared the GMO and non-GMO versions of the rice, chicken and Vitamin B. Data analysis for phase one revealed that people were more willing to consume the non-GMO v GMO rice, but there was no significant difference between whether or not there were added vitamins in the rice conditions. The phase two analysis showed that people were equally willing to consume GMO and non-GMO products, which suggests that attitudes about GMOs differ based on the type of product. This suggests that there is still work to be done in order to improve GMO perceptions; however, there is hope as we are already seeing a shift in attitudes towards this growing biotechnology.

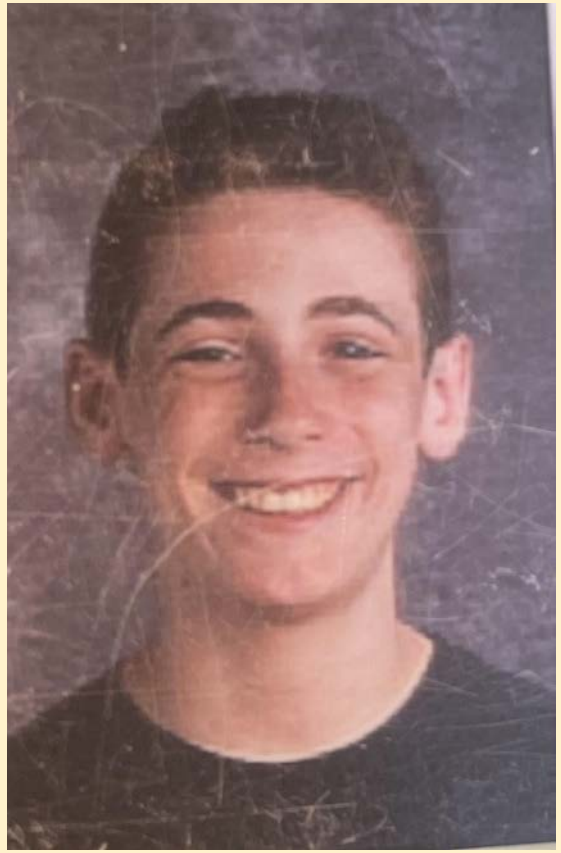
HanByur (Hailee) Youn

Analyses of voter turnout rates in the United States have established that nearly half of eligible American voters consistently choose not to participate in elections (Roberts, 2009). This trend of low voter turnout is predicted to continue and poses an impending threat to our democracy. The present study investigated the effect of descriptive norms and a minority or majority viewpoint on citizens' intention to vote, self-perceived responsibility to vote, and general perception of voting. Two hundred eighty-three citizens over the age of eighteen were recruited through Amazon Mechanical Turk to participate in a survey created through Qualtrics. Participants were randomly assigned to read a flyer encouraging their participation in an upcoming gubernatorial election with a large/small/average previous voter turnout and minority/majority viewpoint of the participant, or no insight of their minority or majority stance in relation to registered voters at all. Participants then reported their intention to vote, self-perceived responsibility to vote, and general perception of voting. Positive descriptive norms, which indicated that there was a large voter turnout, produced a significant difference in all three dependent variables: intention to vote ($p<.001$), self-perceived responsibility to vote ($p<.001$), and general perception of voting ($p<.001$). Interestingly, the effect sizes were enormous and indicated that over 90% of the variance in participants' intention to vote and general perception of voting is accounted for by descriptive norms. Furthermore, a minority viewpoint of participants led to an increased sense of responsibility to vote ($p<.001$). However, the minority or majority viewpoint did not have any significant effect on an individual's intention to vote or their general perception of voting. This experiment suggests that positive descriptive norms and holding a minority viewpoint can be powerful tools in motivating people to vote.

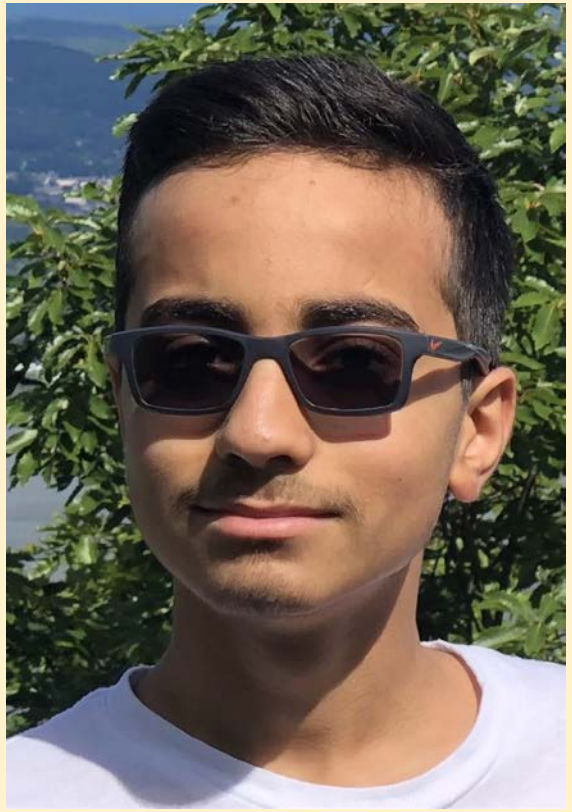
https://youtu.be/DdYCfm_9ffg

SOPHOMORES

Mohammad Balasinorwala and Jake Konigsberg



The pandemic has caught the world unprepared, creating the unprecedented situation of widespread mask shortages. This, in turn, has created a need for the utilization of alternative and homemade masks. However, no studies have examined the effectiveness of these masks. Therefore, the present study investigated the filtration efficiency of various types of alternative and homemade masks and how it may change over time due to wash and wear. Data was collected by putting each mask on the mouth of a mannequin head, which was then placed on to a humidifier. We created a hole in the mannequin head that allowed the mist from the humidifier to travel through it to the mask. The mass change of the mask before and after the humidifier was measured, then divided by the total amount of water released -the final number represented how much water was absorbed by the mask, or in other words, its filtration efficiency. This procedure was utilized to test new (i.e. never used) masks, masks used (i.e. worn) for four hours and used masks that were washed in the washing machine five times. Our results demonstrated that the material of the mask had a significant effect of the filtration efficiency of the mask in the new, used, and washed state ($p<.001$). We also found that there is an insignificant difference between new, used, washed masks ($p>.05$). Based on this, we can conclude that mask material does affect filtration efficiency, as well as that the state of the mask (new, used, and washed) does not have a significant effect on filtration efficiency.



Ron Behiri and Jaiden Berger

This study aimed to explore the issue of why the adoption rate of electric vehicles (EVs) are very low in comparison to the use of conventional gas-fueled vehicles and how we can increase that rate. This research identifies specific benefits of EVs and explores consumers' perceptions of and willingness to buy EVs. 360 participants were recruited on Amazon's Mechanical Turk and randomly assigned to view one of 4 car advertisements. They were shown a variation of two EV benefits (cost and environmental) along with general information about EVs all expressed in an advertisement. They were then asked certain questions that measured their knowledge of, perception of, and willingness to buy EVs. The study found that people were significantly most likely to believe EVs are better for the environment when shown information about the cost benefits of EVs. A possible explanation for this, is people did not want to read the longer infographic and simply skipped over it. The experiment suggested that cost benefits were the most likely of all 4 variables to increase positive perception of and willingness to purchase EVs. Based on these results, EV companies should advertise the cost benefits of EVs more than anything else, in order to increase EVs on the road in hopes to achieve a healthier world for all.

https://youtu.be/ZwG1tYOZmCE

Sonia Chandra and Arya Sinha

With the COVID-19 pandemic causing a substantial shift to virtual methods of learning, working, and interacting, individuals are spending more time in virtual environments, which may have various effects on how they work and think. While many studies have investigated the impacts of clutter in physical environments, there is a lack of research on the effects of virtual clutter; thus, the present study examined the effects of the perception and clutter of a virtual environment on creativity. Participants were 43 high schoolers who were asked to pass an attention check, complete a creativity task after watching a video explaining its instructions, and answer a question regarding their perception of the video's background. The background of the video was manipulated to showcase varying levels of virtual clutter - highly cluttered, moderately cluttered, and plain. The data demonstrated that no participant that viewed the plain background negatively perceived it, leading to the existence of an unfilled condition and consecutively a heightened focus on creativity when assembling the sample. Thus, there was an elimination of all who scored a zero on the creativity task, as it could not be deciphered if a true effort was made. Due to the lack of data for a condition, few tests could be conducted with perception, yet a chi square test demonstrated that the plain background was statistically significantly perceived more positively overall. The highly cluttered background was found to significantly increase creativity when compared to the plain background. Gender was also found to impact creativity, with males being more creative overall, and while these findings were almost significant, they had a great effect size. Until proven otherwise, gender has no significant relationship with creativity. The results of this study suggest that high levels of virtual clutter, like physical clutter, increase creativity.

https://youtu.be/ily_HYQiruY

Jessie Dong and Maxx Yung

With heavy metal contamination spreading in the environment, water pollution is becoming increasingly harmful, causing the destruction of aquatic environments and illnesses in humans. Thus, it is pertinent to search for cost-effective and efficient methods to reduce the concentrations of such pollutants. Research has established that seaweeds can absorb pollutants; however, no studies have researched the ability of seaweed to naturally neutralize these toxins through metabolic functions. This present study aims to research *Sargassum's* ability to neutralize iron, a common water contaminant. *Sargassum* was grown in tanks without iron and in tanks with varying concentrations of iron for two weeks to allow for the absorption of the iron. Ten *Artemia* cysts were put into each well of a 24 well plate, and two sets of experiments were run. A brine shrimp lethality bioassay was then used to compare the cytotoxicity of iron that was exposed to *Sargassum* with iron that was not exposed to *Sargassum*. The hatch rate, survival rate, and lethality rate were calculated in 12-hour increments. The brine shrimp lethality bioassay demonstrated that *Sargassum* absorbed the iron from the water as *Artemia* grown with the *Sargassum* and iron had lower survival rates than *Artemia* with only *Sargassum*. Additionally, the survival rates of *Artemia* with *Sargassum* and iron were higher than those of *Artemia* with only iron and water. This experiment suggests that *Sargassum* has the ability to not only absorb common contaminants from water, such as iron, but can also naturally metabolize the toxicity of iron and turn the contaminant into a safer form.

https://youtu.be/pMOCF39tms8

Jacob Kaftol and Sayem Kamal

Since its emergence in late 2019, COVID-19 has impacted life substantially. Preventative measures such as masks, hand sanitizer, social distancing, and quarantine have become common. No study has specifically examined the effect of brand and style of face masks on the perception of the wearer's personality. However, research has shown that the style of clothing has an effect on social perceptions. This study investigated how the style of face mask worn affects social perceptions of people. Three hundred forty-nine participants were recruited on Amazon Mechanical Turk and were randomly assigned through Qualtrics to view a photo of someone wearing one of three different types of masks (surgical, N95, and cloth). Alongside, were identical vignettes which further described the type of mask the person depicted was wearing. Participants completed the questionnaire which measured perceived intelligence, trustworthiness, and social desirability on 5 point Likert type scales. Ultimately, there was no significant effect of style of mask on intelligence, social desirability, or trustworthiness, refuting our hypotheses. This experiment suggests that the style of mask does not have a significant effect on social perceptions of intelligence, social desirability, or trustworthiness in mask-wearers

https://youtu.be/q7FPEi2uKVw

Rachel Kwon and Sara Rosenbaum

Recent concerns over the expedited rollout of the COVID-19 vaccines and rising xenophobia have contributed to a need for research regarding the origin and length of time in testing vaccines on vaccine hesitancy. A survey was conducted via Qualtrics, which showed each of 412 randomly assigned participants one of nine different versions of a flyer that advertised the COVID-19 vaccination. The nine conditions included a combination of the country in which the vaccine was manufactured (United States, China, or Russia), and the time that vaccine spent in clinical trials (30 days, 6 months, or 18 months) along with other information, like the side effects, which was kept constant. Then, participants were asked to rate two statements on a 5-point Likert scale which assessed how willing they were to receive the vaccine, and how worried they were about the possible side effects. The results revealed that participants were significantly more willing to receive the vaccine and less worried about its side effects when it was manufactured in the United States. However, the time the vaccine spent in clinical trials did not display a correlation nor yield statistically significant results. The experiment suggests that the country in which a vaccine was manufactured has a significant effect on willingness to receive the COVID-19 vaccination, and one's worry about the possible side effects.

https://youtu.be/v0FsdFXwZcw

Kristi Lam, Emelie Nguyen and Samara Yadegari

We live in a society where people make snap judgements about others within seconds and these impressions can be long-lasting. A manner of speech called upspeak, the rising intonation towards the end of a sentence, has been on the rise, especially with the newer generation. The purpose of this study is to explore the effects of upspeak usage, gender, and job ranking on perceptions of personality and hireability in order to determine when or if it is helpful or detrimental to use upspeak in the workplace. In a survey conducted via Qualtrics, we recruited 320 participants, and each was exposed to one of eight conditions of either a male or female being interviewed to be either a boss or subordinate, using either upspeak or no upspeak. They were required to listen to a voice recording and read a vignette both of the job candidate, and answer questions rating their perceptions of the candidate in terms of personality and hireability. The results for job position and gender of the upspeak user, and upspeak were found to have no significant effects on the perceptions of personality and hireability. However, significant interactions were found between the gender of the speaker and job position for both hireability and personality perception. The female was found more likely to be hired than the male, especially when labeled for a subordinate position. Additionally, when interviewed to be a subordinate, females were perceived to have a better personality, but the opposite was true for males. This study suggests that while society does not care for manner of speech, they do care for the gender of the speaker and job position. They see females as more hireable and having better personalities, especially when they are being interviewed for a subordinate position. This could be seen as society supporting women to be in the traditional role of being inferior to men.

https://youtu.be/-Ms-XXvUEeQ

Belinda Lin and Isabella Pozo

Breast cancer is the most common cancer among women. Within the U.S, over 3.8 million women have contracted this disease, with 43,000 death cases from those women. Consequently, researchers have established green tea as a reliable and powerful source of antioxidants that plays a role in lowering the risk of breast cancer. A number of epidemiologic studies have examined the possible association between green tea intake and breast cancer development in humans. To further investigate this relationship, a literature search was conducted with the key words being "breast cancer risk" and "green tea consumption". A meta-analysis of 10 cohorts and case studies was conducted. Each paper provided data on green tea consumption in relation to breast cancer risk from the population of women. To express heterogeneity between the studies, we constructed Funnel Plots via Excel, demonstrating no biases between our datasets. In order to finalize our risk values, we conducted a box plot and a Dersimonian-Laird Model to display clear distinctions in the risk ratios between two groups. Our results indicated that subjects who consumed high levels of green tea had a 23% decreased risk ratio compared to women who consumed low levels of green tea, with only a 1% decreased risk. This study suggests that the consumption of green tea has a major impact on the risk of breast cancer.

https://youtu.be/GOKfiSVk1cQ

Amanda Liswood and Shrimoyee Sen

As the COVID-19 pandemic advanced, mandates including social distancing and the use of masks have been implemented. There have been various studies conducted on the efficacy of different mask materials, but determining the best mask material is still an ongoing debate. In light of recent research, medical masks have been shown to be significantly more effective due to its layer of polypropylene (CDC, 2020). The present study investigated the effectiveness of different mask materials on filtration rates, as well as the impact of washing and drying on the continued efficacy of the masks. The experiment was conducted on four mask materials with and without polypropylene: silk, cotton, medical, and polyester. In order to determine filtration rates, distilled water was used. Additionally, a spectrophotometer was used to measure light transmission of Kool-Aid, a solution containing particles of a known size. The entire procedure was repeated after washing and drying all the masks according to CDC guidelines. After running an ANOVA, our results were shown to be statistically significant for the impact of mask material on filtration rates. Medical and polyester masks with polypropylene were the most effective of all mask types, and the least effective masks were cotton and silk. Our ANOVA on transmission revealed that medical masks with polypropylene are the most effective, while silk and cotton are the least. After running an ANOVA on the effect of mask material on washing, the results were statistically significant, showing medical masks to be the most effective. Overall, this study suggests that medical masks are the most effective. Polypropylene should be added to any type of mask to increase its efficacy. However, washing any type of mask reduces its effectiveness.

https://youtu.be/HnUjv75oSDs

Lemuel Mashkevich and Lior Schwartz

In today's world, news is rapidly spread through social media, especially political news. Studies have shown social media is a catalyst for fake news: 86% of internet users believe they have seen fake news online, and 87% believed the news was true ("Fake News: A Global Epidemic", 2019). The purpose of this study was to see which factors most greatly affect individuals' susceptibility to fake news (misinformation), such as political polarization. Participants (N = 518) were randomly assigned to view one of 6 different stimuli, created to mimic the appearance of tweets. One of each type of tweet contained a truthful statement, while the other one hald a false statement. The fake news tweets claimed that mask wearing increased the chance of Covid-19, while true tweets claimed that mask wearing resulted in decreased chances of Covid-19. Participants only looked at one of the six possible stimuli, and completed a survey that followed. In this survey, the participants had to answer likert-type scales in order to see if they interpreted the tweet correctly or fell for fake news. Participants were not in fact susceptible to fake news, and political polarization did not end up being a factor. However, we found that participants over the age of 65 are statistically significantly more likely to believe that the false news was true, indicating older individuals are more susceptible to misinformation. Responses from participants suggest that individuals are not in fact as susceptible to fake news as we expected, and the wide majority of individuals recognized misinformation when they were shown fake news. The study suggests that while misinformation may not be a major threat to the whole population, older individuals generally are more susceptible to it.

https://youtu.be/sJx3ufJNYKM

Catherine Ren

It is well known that climate change is a major global issue, negatively impacting plants and ecosystems alike. It changes the conditions in which plants grow, such as the pH of soil, temperature, or amount of water they have access to. One area of particular concern that this will affect is food production. With the predicted increase in population, this could become a more serious problem in the coming years, as it could lead to food deficiencies. This experiment aimed to test the effect of an unstable environment on cast-iron plants, which were chosen out of convenience. The experiment was done with two sets of variables: environmental (sunlight exposure + temperature) and ecosystem (soil pH + amount of water available). There were four total treatments (including control), with 3 plants receiving each treatment. At the end experimental period, water uptake rate (cm/hr) and free-standing height were recorded. A one-way ANOVA revealed that there was a significant difference between unstable treatments and water uptake $p<.05$, and unstable treatments and height $p<.05$, with p-values of .0376 (water uptake) and .0239 (height). This experiment shows that an unstable environment can have a negative impact on plant health, even if the conditions are suitable for the plants to survive.

https://youtu.be/0hiD9JuEMI8

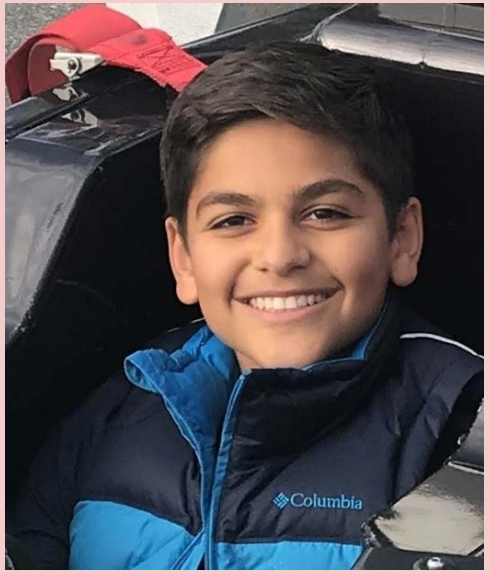
FROSH

Shayla Ai and Ashley Kim

In the digital era, people are constantly bombarded with data and information, which causes small details to be overlooked. Graphs are a common way of presenting information in the place of written data due to their visual component; however, many elements exist that may seem minuscule but have a strong influence over observer perception. An example of this are depth cues, which change a graph's appearance without altering the data. This study explores the difference in data comprehension and perceived aesthetic value between 2D and 3D bar graphs. A sample of 62 students at a suburban high school were randomly assigned to view one of three graphs with identical data: A 2D bar graph, a 2D bar graph with 3D depth cues, and a 3D bar graph arranged in a grid. Each participant was then given two sets of four questions to test data comprehension and perceived aesthetic value. The results showed that increasing depth cues significantly lowered data comprehension, and showed a trend of greater perceived aesthetic value. The results also showed that there was no apparent relationship between data comprehension and aesthetic value. This suggests that observers had a harder time correctly comprehending data when factors that heavily influence appearance were present, and despite the added attractiveness, to present data in an accurate and comprehensible way, fewer depth cues should be added

https://youtu.be/kTd3dRDCOFA

Cole Goodman and Dante Turkashwad



The need for alternative fuel sources has grown rapidly, and creating an aquatic vehicle that can use surfactants as a propulsion system would help cut carbon emissions. It is known that surface tension can be manipulated to break the surface tension of water, allowing boats to move easily (ACI, n.d.). The surface tension of water has been shown to decrease in the presence of a surfactant. Many surfactants perform better than others in terms of decreasing surface tension. The purpose of the present experiment was to test different surfactant's abilities to decrease the surface tension of water and result in greater propulsion, utilizing a miniature raft. Three miniature boats were constructed in the same way and placed in a bathtub with solutions containing various surfactants and water spread at the back and on the underside of the boat. Eight different surfactant solutions were tested and the evaluation of surfactant performance was based on the distance the rafts had traveled in the span of 30 seconds. Solutions with toothpaste had a greater positive effect on distance traveled. This relationship is synonymous with distance and speed indicating that toothpaste can provide increased speed for greater durations of time than other surfactants. The experiment suggests that toothpaste, or an isolated surfactant ingredient found in toothpaste, can be implemented in advanced propulsion systems for water vessels to provide an alternative to harmful fossil fuel energy or scarce renewable energy.

https://youtu.be/HR1ndWamPy0

Jacob Gross, Jim Kaplan, and Noah Janowitz

Research has established that men who eat meat are seen as more masculine than non-meat eaters. This experiment investigated the effect of vegetarianism and veganism (diet) on perceptions of masculinity and how environmentally friendly or "green" someone is. In addition, the experiment investigated which gender is more likely to consider becoming vegetarian or vegan. Students were randomly assigned to view one of three different descriptions, designed to look like a dating profile, of a male. Each profile was identical except for the diet mentioned (omnivore, vegetarian, vegan) and various favorite foods mentioned. Participants were then asked to rate the profile in terms of masculinity and "greenness." Then, participants provided their gender and indicated whether they would consider becoming vegetarian and vegan. Vegans were seen as significantly less masculine compared to omnivores, but all groups were rated equivalently "green." In addition, as hypothesized, women were more likely to consider going vegetarian and vegan than men. Together, the results of this study raise the question of whether men's reluctance to consider a vegetarian or vegan diet may be due to concerns of being perceived as feminine. Vegetarian and vegan diets, according to research, are healthier and better for the environment, and identifying these biases is the first step to strive for change.

https://youtu.be/HWjc7Cuiuuk

Alexandra Kanner, Elle Kaplan, and Sloane Simon

In the United States, obesity is now a larger issue than ever, and ⅓ of adults in the United States are obese. Additionally, while 75% of Americans classify themselves as healthy eaters, in fact, 80% of Americans do not eat the recommended daily amount of fruits and vegetables (Goody & Aubrey, 2016). Packaging plays a large role in perceptions of food, and dieters judge foods more harshly based on packaging and label (Irmak, Vallen, & Robinson, 2011). This study tested the impact of the name and appearance of a baked good on perceived health and taste. We created four conditions of a photograph of a chocolate chip mini cake. We then labeled the image either muffin or cupcake, and we manipulated the photo so that in half the cases, the baked good had a colored wrapper and decorations on top, while in the other conditions, the baked good was in a clear wrapper and had no decorations. Participants(N=100) were randomly assigned an image, and they then answered questions about how tasty and healthy they thought the item was. After analyzing our results, we found that muffins were perceived to be healthier than cupcakes. This effect was especially prominent in those who considered themselves dieters. However, our manipulation of decoration had no statistically significant impact on perceived taste or health, and the manipulation of the name had no significant impact on perceived taste. The findings suggest that the name of an item could affect how people perceive its health value. In addition, the results of the study suggested that dieters are more likely to judge a food's nutritional value based on the name.

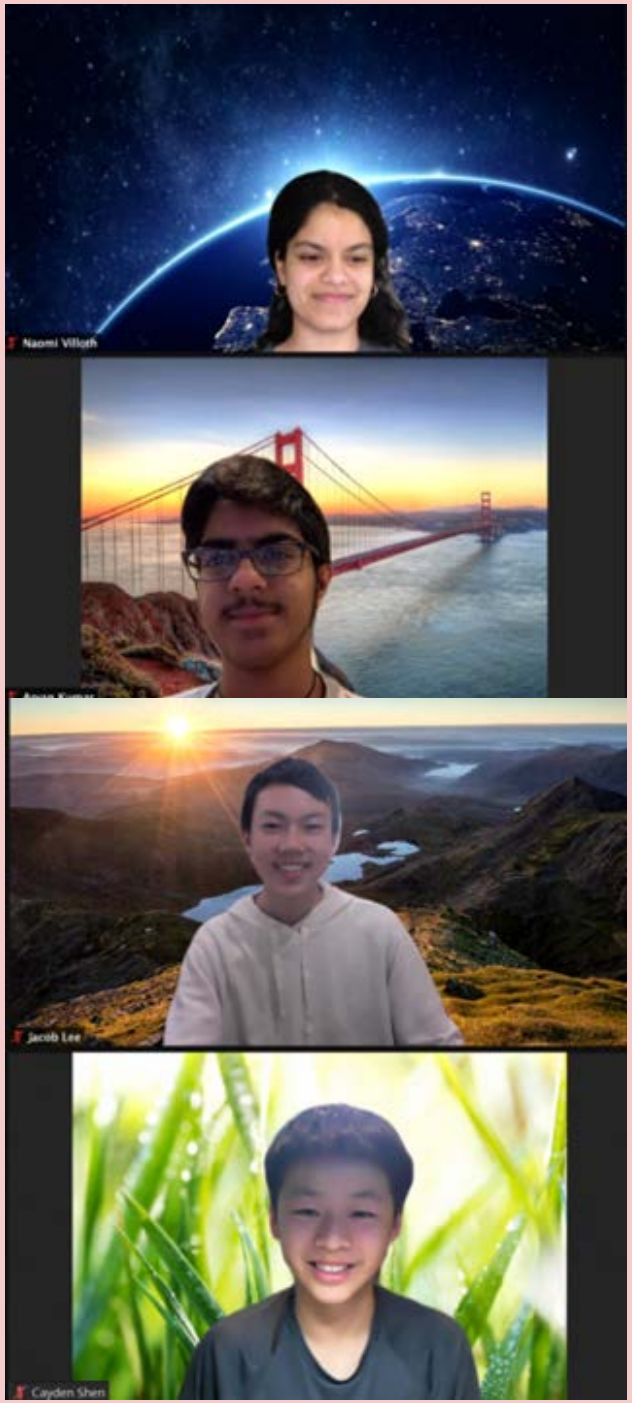
https://youtu.be/6GAqeUescr8

Elizabeth King, Andy Lin, and Chloe Tseng

The COVID-19 pandemic has caused an increase in discrimination and racism towards Asians, especially those living in the United States. In place of coronavirus or COVID-19, the use of unofficial names such as Chinese Virus, Wuhan Virus, Kung Flu, etc. has strengthened the negative stigma surrounding Asian Americans. Constant references to the coronavirus as the "Chinese virus" or "Kung Flu" have negatively linked anti-Asian attitudes to the pandemic (Reny & Barreto, 2020). This study examined the effects of disease names on racism and fear of contracting a virus. A link to a Qualtrics survey was emailed to 90 participants, who were friends and family, over the age of 18. A between-subjects design was used to measure our independent variable of disease name. Participants were randomly assigned an article with a made-up disease name, either Brazilian Virus or AFV-20. They were then asked to fill out a questionnaire that measured their racist attitudes toward Brazilians and their fear of contracting the virus. The results demonstrated that the name of the disease had no significant effect on racism or fear of contracting the virus. However, there was a positive correlation between racism and fear of contracting the virus. This study suggests that the more racist a person is, the more likely they think they will be to contract the virus, regardless of disease name.

https://youtu.be/rs-oAXA2WBw

Aryan Kumar, Jacob Lee, Cayden Shen, and Naomi Villoth



The COVID-19 pandemic has caused a major change in the lifestyles of many people. In order to try and reduce the spread of the virus, guidelines such as social distancing and mask mandates have been implemented. Face masks have quickly been thrust into the spotlight, as people argue if the mask mandates are justified. The psychological impact of masks is a widely unexplored frontier, as it is still a relatively new topic. The present study investigated how face masks affect people's attitudes towards others. A survey was conducted via Qualtrics which showed each participant a different image of a person with one of five conditions: no mask, surgical mask, cloth mask, decorative mask, and bandana. Participants were then asked to answer a series of questions on a 6-point Likert scale about the trustworthiness and approachability of the person in the picture. Although the results were not statistically significant, most tests approached significance. The results indicated that people wearing a mask were perceived to be less trustworthy, but at the same time more approachable. The study also found that people wearing certain kinds of masks, such as a bandana, are less trustworthy than a person wearing other kinds of masks. In addition, women perceived mask-wearers to be more trustworthy and more approachable than men. The study suggests that when a person wears a face mask, it impacts others' perceptions of them, and has many far-reaching effects.

https://youtu.be/tKzHDztJ-qQ

Mason Lee, Zejane Lee, and Jacob Zwerling

Due to the Coronavirus pandemic, it has become evident the name of a disease can have an impact on conclusions that are made about it and changes in behavior towards it. This study investigated the effects of using medicalese or lay terminology on public perceptions of illnesses. Past research has shown the effects of a disease's name on participants' actions, but none have examined the effect of terminology on participants' perceptions. One hundred seventy-five participants were randomly assigned either Verders' Disease (lay terminology), or Vertonisonis Dolseritine (medical terminology). They were then given a survey with two six-point Likert-type scales that measured severity and cautiousness and a scale of 1 to 1000 depicting prevalence. These scales represented answers to questions about the disease; for example, "would I shake someone's hand if this disease is going around my town?" or "how many people my age would contract this disease?" We found that there was a significant effect of the disease's terminology on perceived prevalence (increased with lay terminology); however, the public was equally likely to take strong action (their cautiousness) against both diseases (no statistical significance); and neither name was perceived as more severe than the other (no statistical significance). Overall, people perceived scientific-named diseases to be less common, but did not act more cautious nor perceive them to be more severe.

https://youtu.be/Y81T3HSsCpo

Sofia Lee, Isabella Schiff, Maddie Skopicki, and Hanah Youn

Research has established that people naturally seek the approval of their peers. Nowadays, in the virtual atmosphere of education and the workplace, people continue to care about their appearance through curating their virtual backgrounds. As a result, the present study investigated the effect of the usage of different virtual backgrounds on perceived intelligence and approachability in high school students. Participants took a survey testing the intelligence and approachability of males and females using a bookshelf background, a solid blue background, and a solid red background. As hypothesized, the solid blue background was perceived as more approachable, as compared to the solid red background. Additionally, males were perceived as significantly more approachable and intelligent than females. However, there were no significant differences in intelligence between all three backgrounds. The results suggest that it may be beneficial to employ a solid blue background when intending to seem more approachable, whereas employing a solid red background when intending to seem more intimidating. Our team utilized technology and the resources available to us to discover the perceptions of different virtual backgrounds on web conferencing software programs such as Zoom. We believe our research benefits the community by addressing the significant differences in perceived intelligence and approachability across males and females, through spreading cognizance of this pervasive issue. We hope that through this sense of awareness, we can become one step closer to resolving this social stigma that has prevailed through antiquity, as acceptance of an issue is the first step towards improvement in society.

https://youtu.be/WWazRHY5l0w

Daphne Lin, Fariha Majumder, Stephanie Yeh, and Aasiya Zaidi

In modern society, emojis have become a prominent part of online communication, particularly for younger generations. However, previous research has shown that including emojis in business communication can decrease the perceived professionalism of the sender (Duszyński, 2020), and the use of a “smiley face” in an email can cause perceptions of competence to decrease (Lee, 2017). It also has been suggested that women have a greater familiarity with emojis than men (Ocklenburg, 2020), and therefore may be able to interpret them more accurately. In this study, we explored the effect of emojis on perceptions of an email sent from a hypothetical employee to their boss We employed a wide range of emojis rather than just the smiley face emoji that has been used in most previous work. Our 38 participants were randomly assigned to read an email containing either five emojis or no emojis. In the email, the employee was asking their boss for a promotion, and the content and format were identical for both conditions. Participants were then asked to rank a series of statements related to the perception of the sender’s competence, professionalism, and warmth, followed by demographic questions. The use of emojis in the email marginally decreased perceptions of professionalism. However, it did not affect perceptions of warmth or competence and was not perceived differently by males and females. Our results suggest that emojis may negatively impact perceptions of an individual’s professionalism, so it might be best to avoid their usage when communicating in a work environment. These findings could aid young adults in their professional communication by ensuring that they are not negatively influencing others’ perceptions of them.

https://youtu.be/_Ntfc_OXgIQ

SENIORS!

Jake Azrolan

The Effect of High Glucose on Apol1-microRNA193a in Podocytes and its Relevance in High Glucose and Puromycin Aminonucleoside (PAN) Induced Apoptosis

In the United States, the 9th leading cause of death is kidney disease (Kumar et al., 2019). A kidney cell is called a podocyte. The *Apol1* (Apolipoprotein L1) gene codes for the APOL1 protein, which preserves the podocyte molecular phenotype and affects the kidneys in non-diabetic patients (Mishra et al., 2018). *Apol1* causes differentiation of podocytes. *Apol1* has renal risk alleles G1, G2 that has a close association with podocyte and kidney health and function (Kumar et al., 2019). Both high-glucose and Puromycin Aminonucleoside (PAN), an antibiotic, have been demonstrated to induce dedifferentiation of podocytes, which can cause kidney disease and apoptosis. This study extended previous research by determining if *Apol1G0* allele reduces the level of apoptosis in podocytes under adverse milieus of high glucose, or Puromycin Aminonucleoside. Undifferentiated podocytes were separated into two experimental groups. The first group of podocytes was probed for proteins that make up the cytoskeleton to determine any structural disruption. The second group of podocytes was probed for proteins that indicate dedifferentiation of the podocyte. Apoptotic cell marker Caspase-1 was also used to detect apoptosis of the podocyte. This study showed that high glucose down-regulated *Apol1* and up-regulated miRNA193a in podocytes. The up-regulation of miRNA193a caused the dedifferentiation of the podocyte, which may lead to kidney disease. In addition, high levels of *Apol1* were found to protect against high glucose and PAN induced apoptosis through the downregulation of miRNA193a. These findings will help elucidate the mechanism of podocyte injury leading to chronic kidney disease and protection against apoptosis.

https://youtu.be/naSxNoUO7nQ

Laura Chu

Novel Combinations of Plant Bioactive Chemicals Enhance Lenalidomide's Efficacy against Colon Cancer Cells as Measured by Apoptosis, Migration, and Immune Regulation

Chemotherapy drugs are effective in terms of stopping the spread of cancer, but these treatments cause negative side effects such as hair loss and a weakened immune system. Immunotherapy can be a solution to this problem by boosting the body's natural defenses to fight cancer without negative side effects. In this study, affordable bioactive chemicals were used to target cell survival rate, cell migration, immune regulation, and cytokine expression. Resveratrol, luteolin, curcumin, and lenalidomide were tested independently and in different combinations. The results showed that while the chemicals were effective independently and in pairs, the three chemical combinations showed most promise because the natural chemicals were able to enhance the effects of lenalidomide. The study suggests that lenalidomide combined with resveratrol and luteolin can contribute to making cancer treatments more affordable and effective as well as easier on patients' immune systems. In the future, these chemical combinations can hopefully be employed to improve cancer treatment around the globe.

https://youtu.be/PxZyE2Z3a_8

Chelsea Kumar

Development of a Unidirectional Vagus Nerve Stimulator

Gastrointestinal tract (GI) disorders affect an estimated 70 million Americans each year. Common treatments are often time consuming, expensive, and ineffective against those suffering with chronic GI tract disorders. Vagus nerve stimulation (VNS) has been explored as a treatment for a variety of autoimmune and chronic inflammatory disorders, due to its demonstrated anti-inflammatory properties. VNS has been approved by the FDA (Food and Drug Administration) for use in the treatment of epilepsy and depression. Stimulation of the vagus nerve provides a way to regulate autonomic tones as the after end projections of the vagus nerve are integrated at the level of the autonomic brainstem before projecting to other regions of the central nervous system. Stimulation paired with kilohertz electrical stimulation, or a "blocking" signal, has been shown to enhance anti-inflammatory benefits of VNS for the cervical vagus nerve, which is the area of the vagus nerve to be stimulated. Thus developing a unidirectional vagus nerve stimulator, as using the blocking signal, the stimulating signal will propagate in the single direction of choice. The device has been designed and developed to be capable of generating two simultaneous signals, one for stimulating at a range of 10-20 Hz, and one blocking in the range of 10KHz. Using a 4 layered PCB and an external voltage regulator, the device has the width and length of 50mm. Commercial off-the-shelf components were used for the device's development. The system has the capability to be used for treating functional gastrointestinal disorders in future.

https://youtu.be/C-QQTsmm7no

Katie Lam

Testing Efficacy of SDHI Fungicides on Apple Scab of Varying Cultivars

Apple scab is one of the most common illnesses plaguing apples. Worldwide, growers are finding diseases harder to prevent and manage due to the onset of resistance to fungicides. The fungi causing apple scab (*Venturia inaequalis*) are becoming resistant to traditional fungicides such as established demethylation inhibitors (DMI). Over the past decade, newer fungicides with a different mode-of-action targeting natural cellular processes have been developed for apple scab. This study aimed to test the efficacy of one type of these new fungicides, SDHI (succinate dehydrogenase inhibitor) fungicides, on the three most commonly grown and consumed cultivars in New York State: Jersey Mcintosh, Cortland, and Golden Delicious. There were 14 treatments: three biological controls, four DMIs, and three SDHIs, including two different untreated controls. The percent scab infection incidence on spur leaves and fruit was rated and calculated from the number of spur leaves or fruit with scab versus the total number of leaves or fruit in each sample. Apple scab infections were analyzed with ANOVAs and pairwise comparisons, and graphed using Excel spreadsheets. It was found that the fungus causing apple scab *Venturia inaequalis* was controlled by SDHI fungicides just as effectively as DMIs and better than biological controls. The results showed that on both spur leaves and fruit, the Jersey Mac cultivar experienced the highest incidence of scab. Cortland had the second highest scab incidence and Golden Delicious exhibited the least scab, which is related to their genetic proneness to resistance. Thus, increasing our knowledge of plant pathology and different variants of fungicidal control is useful both economically and sustainably, decreasing the effects of apple scab to growers and farmers within New York State, and ultimately, the worldwide consumer market.

https://youtu.be/oE-RoujqeM8

Faith Lee

The Effects of Binaural Beats and Self-Selected Music on Dental Anxiety

Dental fear and anxiety are some of the most significant factors that lead to the avoidance of dental care. One non-pharmaceutical approach to decrease dental anxiety is utilizing music. Listening to self-selected music is one technique shown to lower medical anxiety. Another audio technique called binaural beats plays specific frequencies that can have effects on the "brain state" by syncing the brain waves to the binaural beats. These music types have been shown to lower blood pressure and heart rate, however, these two techniques have not been compared using the same measurements. The present study compared the effects of listening to self-selected music and binaural beats during a dental procedure in attempts to lower dental anxiety. Thirty-nine participants were randomly assigned to listen to either self-selected music, binaural beats, or no music. Their heart rate and blood pressure were measured three times (before, during, after the procedure). They completed the Modified Dental Anxiety Scale before the procedure to measure their baseline dental anxiety. After the procedure, they answered a question based on the Patient Rating of Anxiety that asks "How would you describe your anxiety during the dental treatment today?" on a scale of 1 (calm and relaxed) to 7 (extremely tense and upset). A one-way ANOVA revealed that patients' heart rate decreased from pre to during the procedure ($p < .001$) and from during to post-procedure ($p < .01$) for both types of music. However, neither of the types of music had an effect on blood pressure or self-reported anxiety. This experiment suggests that listening to binaural beats and self-selected music lowers heart rate, but patients do not consciously feel less anxious which was measured by the self-reported scale.

https://youtu.be/_gIcp89ySN8

Sara Lok

Gender Bias and the Implications on Custody Battles

Traditional gender roles dictate that the man is the primary breadwinner and the woman is the primary caregiver. While American society has progressed beyond these roles, remnants of them still exist. The purpose of this study was to look at how perceptions of gender roles affect custody decisions and perceptions of parental competence. Participants ($N = 302$) were randomly assigned to read one of two vignettes describing a heterosexual couple divorcing, with both parents asking to be the custodial parent. In both cases, one parent worked from home while the other worked outside the home, and the only thing manipulated within each condition was which parent (the mother or the father) was the stay-at-home parent. After reading the vignette, each participant was asked who they would choose as a custodial parent and their perceptions of both parents' competence. Overall, stay-at-home parents were chosen as primary custodial parents more often than working parents but did not have significantly higher competence ratings. This preference occurred regardless of whether the stay-at-home parent was male or female. However, there was a significant interaction found between parent gender and work location on perceptions of competence; stay-at-home fathers were rated as a little more competent than working fathers while stay-at-home mothers and working were rated pretty much the same. These results suggest that stay-at-home parents are preferred over parents that work outside the home in terms of custody decisions. Overall, this study suggests that while people have a clear preference for stay-at-home parents, they do not have a clear preference for mothers.

https://youtu.be/iHvZzvqm_X4

Elena Lynn

Youth's Perceptions of Electronic and Traditional Cigarettes

Electronic cigarettes have become increasingly popular over recent years especially with teenagers. While they were originally marketed as a safer alternative to traditional cigarettes, recent research has revealed an increasing number of harm associated with electronic cigarettes. The purpose of the study was to analyze teens' perceptions of electronic cigarettes given that recent research has demonstrated potentially severe negative effects. Sixty-one teenagers from a school in New York state were surveyed about the perceived harm and knowledge of electronic cigarettes and traditional cigarettes. Participants were found to be similarly knowledgeable about electronic cigarettes and cigarettes but thought electronic cigarettes were less dangerous than conventional cigarettes. There was no relationship between the perceived danger of electronic cigarettes and participant's intention to try them. The study suggests that teen's need to be better educated on electronic cigarettes in order to change the belief that electronic cigarettes are safe to use.

https://youtu.be/WO48oQBDrMc

Ali Malik

Investigating Chronic Sinusitis as a Cause of Chronic Cough

Although chronic cough is a widespread disorder and has been previously studied, it goes unexplained in approximately 10% of cases, and diagnosis success rates are suboptimal (Kaplan, 2019). A suspected reasoning for these unexplained cases and suboptimal diagnoses success rates is the presence of a variety of disorders in one patient, some being more initially apparent than others. This can lead to misdiagnosis due to the oversight of the initially less apparent cause. This issue is rooted in the common failure to recognize causes outside of the airway such as sinus inflammation disorders including chronic sinusitis (Morice, 2004). This study aimed to detect the frequencies of various causes of chronic cough, with specific emphasis on the potential prevalence of chronic sinusitis. Data was collected from a sample of 440 patients from Crown Heights Medical Center's chronic cough patient population. Progress notes were used to assess whether or not the patient's cough was chronic and problem lists, which were summaries of a patient's various health disorders, were used to detect the patient's associated disorder/cause of chronic cough. A frequency of 94.3% was detected for chronic sinusitis, 46.1% for asthma, 12.5% for GERD, and 4% for others. Additionally, 93% of the chronic cough cases were successfully treated, which indicates overall diagnoses success (Mayo Clinic, 2005). These findings suggest that chronic sinusitis is the most common cause of chronic cough and opens up the possibility that chronic sinusitis should be treated first in chronic cough patients for optimal diagnosis and treatment success. Additionally, 46.02 % of chronic sinusitis patients also suffered from asthma, indicating that a possible explanation of the underreporting of chronic sinusitis is that it is often overshadowed by asthma present in the patient.

https://youtu.be/QGvJXqrEPgU

Joselle Mashkevich

Banning Discrimination: The Effect of Ban the Box on the Perceptions of Job Applicants

There is a growing population of ex-convicts in the United States, and their increasing inability to successfully reintegrate into society is producing consequences for them and the country as well. The Ban the Box movement was created in order to try to solve the problem of employers automatically assuming negative things about an applicant who is an ex-convict. The purpose of this study was to see how likely people are to hire an applicant with or without a criminal history field on their application based on the applicant's race and gender. Each participant was randomly assigned to one of twelve conditions. The race, gender, and criminal history of the applicant were manipulated in each condition. Participants either saw an application where the applicant had indicated they had no criminal history, had a criminal history, or an application that omitted this information. They viewed a job application and then were asked if they would hire the applicant, followed by a scale to assess their perceptions of the trustworthiness of the applicant. There was a significant difference found between the hiring rates of men and women within the checked box condition where male applicants were hired more often. However, the hiring rates within the no box condition were relatively similar. This same pattern is seen when comparing the hiring rates of African American female and White female applicants. These findings suggest that Ban the Box actually helps reduce discrimination between men and women, and is specifically beneficial for African American women. Due to these results, the benefits of Ban the Box suggest it should be implemented to help ex-convicts successfully re-enter the workforce.

https://youtu.be/3zEZT8WkPAY

Ariana Matarangas

Simplifying the Prediction of Autism Spectrum Disorder: An Improved and Rescaled K Nearest Neighbor Model

Autism Spectrum Disorder (ASD) has become increasingly prevalent over the last several decades largely due to greater awareness and better monitoring of the disorder. Despite such improvements, problems persist with diagnosing ASD as there are many instances of delayed diagnosis that can impact the treatment of the disorder; these delayed diagnoses prevent early interventions from beginning during critical stages of child development. The current diagnostic instrument, the Autism Diagnostic Observation Schedule (ADOS), is an entirely qualitative instrument that relies on the interaction between a clinical examiner and the individual in a series of structured tasks; current procedures relating to the ADOS are very time-consuming and cannot keep up with the demand for appointments with clinical professionals to diagnose the disorder, leading to delayed diagnoses. A possible solution lies in machine learning models, specifically using the K Nearest Neighbor (KNN) algorithm. Machine learning models can predict ASD diagnoses using simpler, more quantitative data without the need for a clinical professional and are regarded as a potential solution in terms of reducing time, while increasing accuracy, cost-effectiveness, and availability. The current study focused on improving a machine learning model using the KNN algorithm by including data from the Social Responsiveness Scale and rescaling techniques not used in prior studies. The resulting model generated an accuracy score of 90.583%, an area under the receiver curve (AUC) measurement of 90.577%, a precision score of 89.623%, a recall score of 90.476%, and an F-measure of 90.047%. These performance metrics of the rescaled and the non-rescaled KNN machine learning models suggest they are effective predictors for ASD diagnosis.

https://youtu.be/H4mcw1sIbH0

Alida Pahlevan

Constructing Expression Vectors to Elucidate the Localization and Expression of the ADNP Protein

Research has shown that about 1 in every 59 children and 1-1.2% of the adult population is diagnosed with Autism Spectrum Disorder (ASD). Despite the increasing prevalence of the disorder, the lengthy baseline diagnostic process remains the same. However, research has shown that machine learning methods (ML) can be implemented to streamline the detection of ASD in a matter of minutes. A specific type of ML model, a convolutional neural network (CNN), can be trained on MRI images and can learn to detect ASD. In this study, MRI images from the ABIDE I database were converted into a viewable format and then filtered and fed through a CNN. The model achieved 76% accuracy predicting ASD, which is higher than most of the models available. Accuracy was even higher when the dataset was divided by gender; it was 83% when looking just at females and 84% when looking just at males. These findings suggest that MRI analysis by a CNN has the potential to streamline the diagnostic process for ASD.

https://youtu.be/YJyyHjMRNlI

Emily Ruttgeizer

He Said, She Said, They? Said: Opinions of Gender-Neutral Pronouns and Their Effect on Perceptions of Transgender People

Although the number of transgender people in the United States is rising, discrimination remains a widespread problem. One common form of discrimination that transgender people face is misgendering, being called by a wrong or former name or pronoun. Research has shown that over time, people have started to have more favorable opinions of transgender people and gender-neutral pronouns. In phase 1 of the present study, American adults were surveyed about their attitudes toward transgender people and gender-neutral pronouns to explore gender and age differences. More than half of the participants were familiar with the use of gender-neutral pronouns, and while age was not related to attitudes toward gender-neutral pronouns, women were more accepting of transgender people and gender-neutral pronouns than men. In phase two of the study, 131 participants were randomly assigned to view a description of a transgender science teacher, either using the pronoun he, she, or they. Participants then evaluated the teacher's competence. When teachers were referred to as "he," they were rated significantly more competent than when referred to as "they." This study suggests that people may still be hesitant to accept the use of gender-neutral pronouns to refer to transgender individuals and that the pronouns one selects may have effects on the way that others perceive them.

https://youtu.be/3ij6mYFHDMk

Brooke Williams

The Effect of Race on the Perception of Credibility in Cases of Workplace

Accusations of crimes involving sexual harassment, assault, and rape seem often to boil down to disputes between accused and accuser about what actually transpired. Race has a large impact on the perceptions of credibility. Given the ambiguous nature of some sexual harassment allegations, the purpose of this study was to see how the race of the accuser and accused affect credibility in an incident of workplace sexual assault. Participants (N=248) were randomly assigned to view one of four vignettes that described a male coworker sexually harassing a female coworker. To manipulate the race of the accuser, the accuser was either named "Emma" or "Deja". To manipulate the race of the perpetrator, the perpetrator was either named "Colin" or "Jamal". After viewing the vignette, participants took a survey that measured credibility of both accuser and accused in the vignette. Participants also answered questions that measured their tendency to blame the victim in cases of sexual harassment. The results revealed that participants rated accusers of their own race as more credible than those of another race. The results also showed that White participants and Asian participants rated the Black perpetrator to be more credible than the White perpetrator, whereas Latino and Black participants rated the White perpetrator to be significantly more credible than the Black perpetrator. Finally, the results showed that Asian/ Asian American participants were found to victim blame more than any other group. This experiment suggests that race plays a large part in perceptions of credibility in sexual harassment.

https://youtu.be/fwqB7gzwvZc