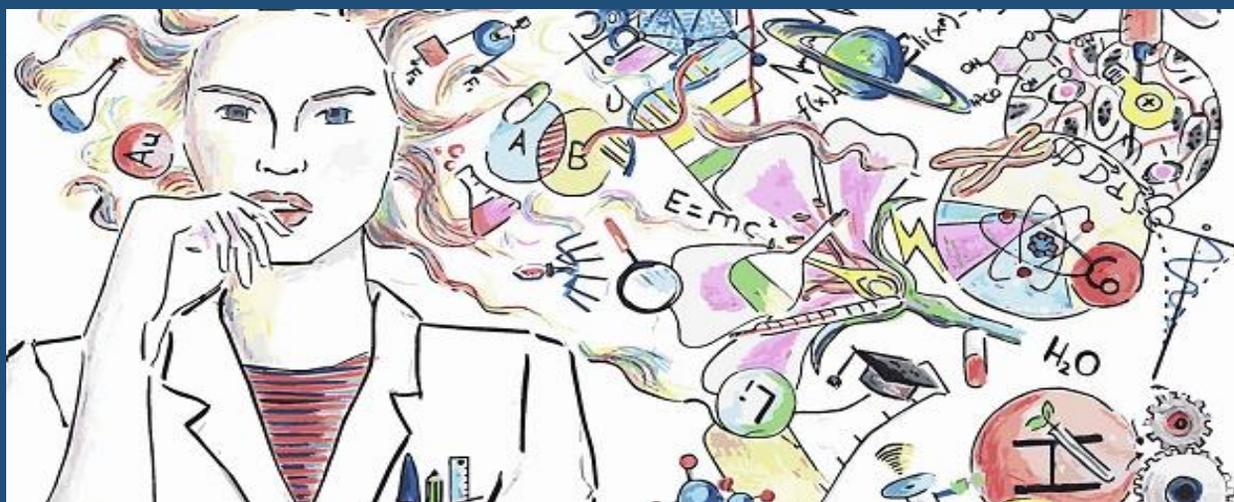




# WOMEN IN SCIENCE AT COLUMBIA

## GRADUATE RESEARCH SYMPOSIUM

*Facing Forward: Empowering Women and  
Effectively Communicating Science*



## SYMPOSIUM PROGRAM

SATURDAY, APRIL 14, 2018  
EARL HALL, COLUMBIA UNIVERSITY

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# **WISC Annual Graduate Research Symposium**

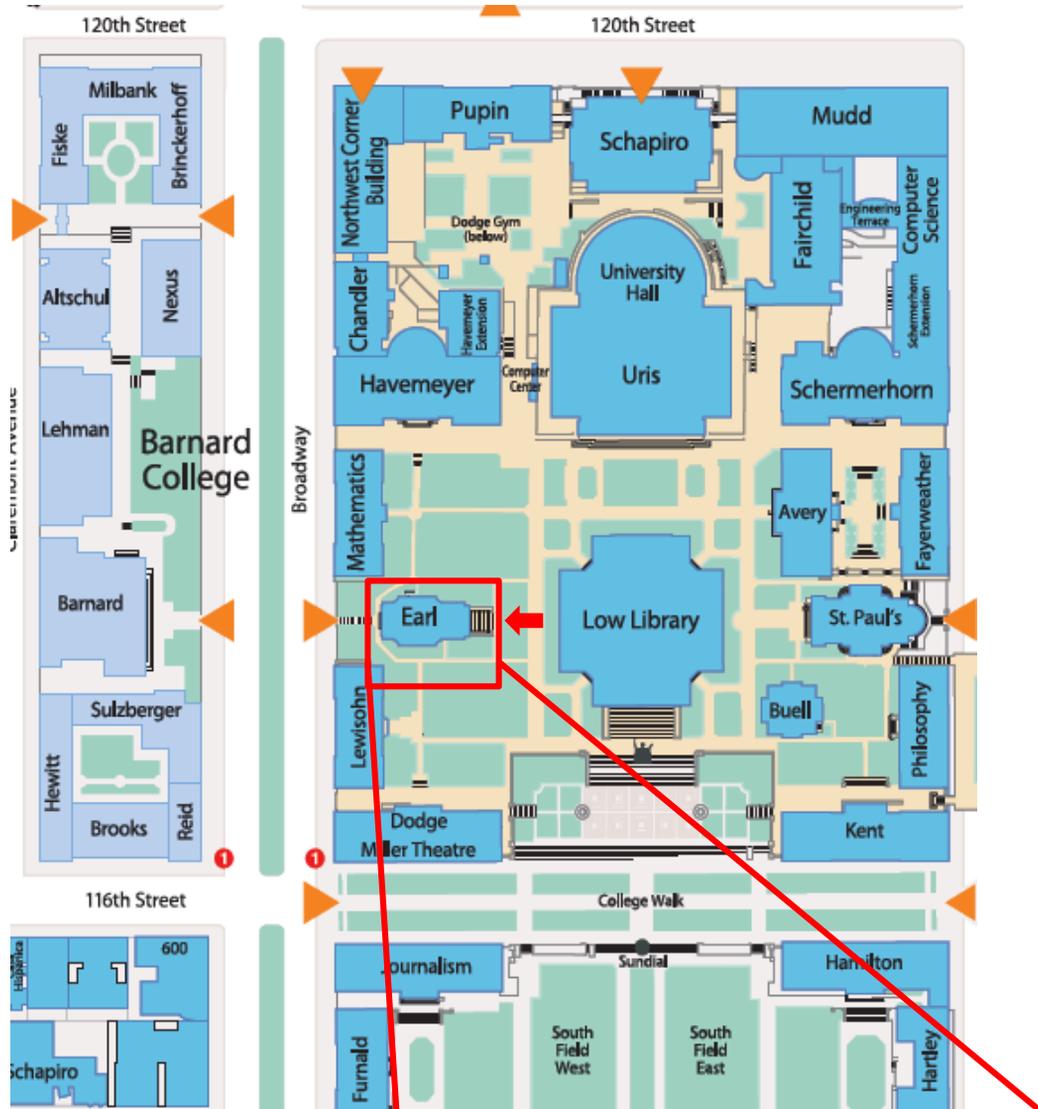
is a celebration of the guiding principles of *Women in Science at Columbia*, as we bring together interdisciplinary researchers in STEM for a day of learning, communication and connection.

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# Direction to Earl Hall

Earl Hall is located on Columbia University's main Campus at 2980 Broadway, New York.



- Take #1 train to 116th St. (Columbia University) stop.
- Red arrow indicates the entrance of Earl Hall.



# Schedule

<b>8:30-9:30</b>	Breakfast and Poster Setup
<b>9:30-9:45</b>	Welcome from WISC
<b>9:45-10:30</b>	Opening Keynote Speech <b><i>Dr. Kuheli Dutt</i></b>
<b>10:30-12:00</b>	Student Research Presentations
<b>12:00-1:00</b>	Lunch and OMBUDS Workshop <b><i>Protect and Empower Yourself In Lab Legally: Up, Down &amp; Sideways – Joan C. Waters</i></b>
<b>1:00-2:00</b>	Panel Discussion <b><i>Effective Science Communication – Dr. Mariam Aly, Dr. Andrei Cimpian, Meehan Crist, Dr. Niyo Kato</i></b>
<b>2:00-2:45</b>	Student Research Presentations
<b>2:45-3:00</b>	Break
<b>3:00-4:00</b>	Poster Session
<b>4:00-4:45</b>	Closing Keynote Speech <b><i>Dr. Carol Mason</i></b>
<b>4:45-5:00</b>	Awards and Closing Remarks
<b>5:00-6:00</b>	Networking Reception

# Keynote Speakers

## **Dr. Kuheli Dutt**

*Assistant Director of Academic Affairs and Diversity,  
Lamont-Doherty*



Kuheli is passionate about promoting an institutional shift on implicit bias, disseminating social science research, and developing salary structures, mentoring programs, and bylaws and governance, and the advancement of junior scientists. She is also the author of *Women in the Geosciences: Practical, positive practices towards parity*.

## **Dr. Carol Mason**

*Professor of Neuroscience, Pathology and Cell Biology,  
and Ophthalmic Science*



Carol is co-director of the Doctoral Program in Neurobiology and behavior, as well as Chair of Interschool Planning at Columbia's Zuckerman Institute. In her research, she studies the circuitry of the visual system to understand how neurons that extend from the eyes make their way to their specified destinations deep in the brain.

# Speaker Biographies

**Dr. Mariam Aly - Assistant Professor of Psychology,  
Columbia University**

Dr. Aly studies cognitive neuroscience, attention, and memory. She is also passionate about relaying science to the general public.



**Dr. Andrei Cimpian - Associate Professor of Psychology,  
NYU**

Dr. Cimpian studies cognitive development in the context of motivation and gender gaps. He recently published his work on genius beliefs and gender disparities in STEM fields in the journal *Science*.



**Meehan Crist - Writer-in-residence in Biological Sciences,  
Columbia University**

Meehan has been the editor-at-large at *Nautilus* and reviews editor at the *Believer*. She has written for the *New York Times*, the *Los Angeles Times*, *Science*, and *Scientific American*. She currently hosts *Convergence*, a live show exploring the future implication of science and technology.



**Dr. Niyo Kato - Scientific Associate, Scientific Services,  
Chameleon US**

Niyo is a recent graduate from the Biological Sciences Department at Columbia, currently working for a consultancy group associated with Health Science Communications.



**Joan C. Waters - OMBUDS Officer**

Joan C. Waters served as an Associate General Counsel in the Office of the General Counsel at The City University of New York. Since joining Columbia Joan has become a member of the International Ombudsmans Association.



# Student Research Presentations

**10:30-** The stability of black holes

**10:45** Elena Giorgi, *Mathematics*

General relativity is one of the most complete theories that describe the physical laws of the universe. The Newtonian space and absolute time are unified in a four dimensional mathematical object, with three spatial dimensions and one time direction, called spacetime. Physical realities translate in mathematical properties of the spacetime, encoded in the Einstein equation, which relates the curvature of the spacetime to the presence and distribution of matter and energy. Very special examples of spacetimes are black holes. Physically, they represent objects that are so massive that not even light can escape them. Mathematical solutions to the Einstein equation with these properties were discovered immediately after the formulation of general relativity, in 1916. But it took many decades to give physical credibility to this mathematical entity, and to actually observe (indirectly!) real black holes in the sky. Nowadays, we know there is a giant black hole in the middle of our galaxy and we indirectly observed dozens more. In September 2015, gravitational waves emitted from the merging of two black holes were first observed by LIGO, leading to the 2017 Physics Nobel Prize, leaving no serious doubt to the physical existence of these objects. Nevertheless, a mathematical proof of reality of black holes is missing. It could seem paradoxical to talk about a proof of reality that goes beyond observation, but it is not. In order to be considered useful in physics, a mathematical object has to be stable under perturbations. Every measurement in physics is an approximate number, and the predictions of any reliable physical theory should not be dramatically affected by a small change in the input data. Solving the problem of stability of black holes consists then in proving that a solution of the Einstein equation which is slightly perturbed from a given black hole will remain similar to it. My thesis aims at proving the stability of a black hole that is spherical and possesses an electromagnetic charge. In addition to the Einstein equation, the charge of the black hole verifies Maxwell's equations, and those together form a coupled system of non linear partial differential equations that governs the evolution of the spacetime. These equations are of the same type as the wave equation, and describe in fact the waves of energy that radiate away from the black hole in the stabilizing process. This is the first step towards a complete proof of stability of charged black holes with no additional symmetry assumptions.

# Student Research Presentations

**10:45-11:00** **Holocene and Last Interglacial climate of the Faroe Islands from sedimentary leaf wax hydrogen and carbon isotopes**  
**Lorelei Curtin , *Earth and Environmental Sciences***

The climate of the North Atlantic region is extremely sensitive to changes in ocean and atmospheric circulation, which impact local terrestrial environments. Understanding past natural variability in North Atlantic climate provides important context for modern climate change, and records of past climate are important for evaluating climate models. Here, we present Holocene and Last Interglacial hydrogen isotope ( $\delta D$ ) records from leaf waxes preserved in lacustrine sediments from the North Atlantic Faroe Islands and interpret them as a proxy for temperature and hydroclimate variability. In addition to helping to constrain the timing and amplitude of climate evolution during each of these interglacial periods, the data can be used to directly compare Eemian and Holocene climate using the same proxy from the same terrestrial location. Of the leaf waxes measured, the  $\delta D$  values of long-chain and mid-chain n-alkanes showed two different signals, which we interpret to represent leaf water  $\delta D$  values and lake water  $\delta D$  values, respectively. The  $\delta D$  values for long-chain and mid-chain fatty acids were most similar to the mid-chain n-alkanes, and likely represent a mixture of terrestrial and aquatic sources, which was confirmed by comparing the  $\delta^{13}C$  values of the same wax groups. Inferred lake water  $\delta D$  values, which are most closely linked to precipitation isotopes, decreased slowly over the late Holocene, suggesting a gradual transition to a cooler, more "Arctic" climate after 4,000 cal yr BP. At  $\sim 2,000$  cal yr BP there was a significant change in the distribution of leaf waxes that suggests a transition from shrubland to grassland, but which pre-dates the pollen evidence for this transition. The last interglacial period has been suggested as an analog for future climate conditions. Here, we find that  $\delta D$  values from the Last Interglacial are similar in value to the average Holocene, suggesting that the earliest Holocene may in fact be the best analog for future change in the Faroe Islands.

# Student Research Presentations

**11:00-11:15**     **A Review of the Literature on PCIT Interventions for children with ASD**  
**Isabel Ghisolfi, *Psychology***

This literature review reviews studies examining the implementation and effectiveness of Parent-Child Interaction Therapy (PCIT) for children with Autism Spectrum Disorder (ASD). PCIT is a research-supported parent coaching and child-focused intervention that has been found to be highly effective for behavior disorders such as Oppositional Defiant Disorder (ODD) and Conduct Disorder (CD). Young children with ASD often present with a range of behavioral problems similar to ODD and CD including aggression, tantrums and difficulty transitioning between activities. More specifically, eighty percent of ASD patients are estimated to also experience comorbid disruptive disorders (de Bruin, Ferdinand, Meester, de Nijis, & Verheij, 2007). Therefore, PCIT holds considerable promise as a potentially effective treatment for children with ASD. This paper describes the research examining the use of PCIT with families of individuals with autism, and explores potential modifications to the standard PCIT protocol for use with ASD patients. The reviewed studies reveal that PCIT interventions for children with ASD yield positive results in decreasing the intensity and frequency of child disruptive behaviors and parental distress related such behaviors. However, the decrease for parental distress was more significant compared to the decrease of the intensity and frequency of such behaviors (ECBI intensity score). These findings suggest that even if some child problem behaviors do not seem to decrease in intensity or frequency, parents are less likely to rate such behaviors as problematic and stressful. A possible explanation might be that once parents have acquired PCIT training, they might feel more confident in their abilities to effectively address and handle problem behaviors. Further research should investigate the causes behind this finding..

Challenging behaviors represent some of the most concerning and stressful features of autism. These behaviors can often cause harm or damage, family and staff stress, isolation, and caregiver burnout. Furthermore, disruptive behaviors contribute to decreased health and well-being of individuals with ASDs. PCIT offers a solution to manage and decrease problem behaviors at an early age so that children with autism will not be impaired by such restrictions and limitations.

Although ASD encompasses many symptoms, externalizing ones such as disruptive behaviors often have the most serious consequences, such as school suspension and hospitalization. Therefore, it is critical to address such symptoms at an early age with tailored implementations such as PCIT in order to limit negative outcomes.

# Student Research Presentations

**11:15-11:30**     **Human lymph nodes are reservoirs for self-renewing memory T cells throughout life**  
**Michelle Miron, *Microbiology and Immunology***

In an immune response, T cells are activated and differentiate to effector and memory subsets that play distinct roles in adaptive immunity and immune homeostasis. Effector cells are short lived and secrete proinflammatory cytokines and cytotoxic mediators for pathogen destruction, while memory T cells are long-lived and can mediate rapid recall responses upon antigen re-encounter. Studies in mouse models have identified key transcription factors (TF) that determine effector versus memory T cell fate; T cell factor-1 (TCF-1) is essential for memory T cell formation and maintenance in the periphery and T-bet promotes effector over memory T cell differentiation. For human T cells, the role of specific TF in the differentiation and maintenance of effector and memory T cells remain unclear. In addition to T cell intrinsic factors, the tissue environment also influences T cell fate and memory maintenance. Human memory T cells are diversely distributed across multiple anatomic sites and comprise the predominant subset in most tissues for the majority of life. In this study, we investigated the tissue determinants of human T cell differentiation using our unique human tissue resource where we obtain blood, multiple lymphoid and mucosal tissues from individual organ donors of all ages through a longstanding collaboration with LiveOnNY, the organ procurement organization for the New York City metropolitan area. By studying T cells across tissues of individuals, we have identified that memory CD8<sup>+</sup>T cells maintained in human LN are organ-specific. Notably, LN memory CD8<sup>+</sup>T cells maintain high expression of transcription factor TCF-1 associated with cellular quiescence and self-renewal, exhibit low turnover and a higher proliferative capacity compared to memory T cells in other lymphoid (spleen, bone marrow) and peripheral sites (e.g., lungs). Together these findings establish human LN as important targets for promoting protection in vaccines and a source of high potential T cells for harnessing in immunotherapies.

# Student Research Presentations

**11:30-11:45 Self-Assembly of Nearly Isotropic Conjugated Polymer Aggregates with High Quenching Efficiency**  
**Youngah Karen Kwon, *Chemistry***

The link between conformation and photophysical properties in single conjugated polymers has been extensively studied for over a decade, with particular focus on exciton (coupled electron-hole pair) creation, diffusion, and recombination. Understanding of exciton behavior in environments more relevant to devices, however, is still lacking due to conformational heterogeneity and resulting complexity both intra- and inter-molecularly. To bridge the gap between single-molecule and bulk film studies, we prepare mesoscopic aggregates through well-controlled solvent vapor annealing of a film of an inert polymeric matrix containing a high concentration of the conjugated polymer of interest, in this case, the model conjugated polymer, poly(2-methoxy-5-(2-ethylhexyloxy)-1,4-phenylenevinylene). Using a multi-modal apparatus to simultaneously control the solvent vapor annealing process and image aggregates as they form, we show that starting with chloroform as a solvent during sample preparation results in aggregates with nearly isotropic conformation. This result indicates that single-molecule conformation serves as a template for the final aggregate conformation. Furthermore, by analyzing degree of quenching in these aggregates and jump-sizes observed in fluorescence intensity transient curves obtained upon photobleaching the aggregates, unexpectedly high exciton mobility was found. We conclude that the small exciton domains in the nearly isotropic aggregates act as bridges that promote efficient exciton migration. This result will further our understanding of the exciton migration behavior at the device-level, which will facilitate development of organic optoelectronic devices with high efficiency.

# Student Research Presentations

**2:00 – A p53 independent role for Mdm2-X in ferroptosis**

**2:15 Divya Venkatesh, *Biology***

The p53 tumor suppressor network is known to play a significant role in regulating cell survival and tumorigenesis. Recently, many studies have described the role of the p53 network in ferroptosis, a recently discovered form of cell death. Ferroptotic cell death is a non-apoptotic process that kills cancer cells owing to excessive oxidation of lipids. Through this study, we have demonstrated the relevance of the p53 network to ferroptosis by showing that two key proteins of the network, Mdm2 and MdmX are also able to modulate ferroptosis. Using various methods to interfere with the levels and activity of the Mdm2-X complex in cells, we have been able to alter the ferroptosis sensitivity of cells. Our results have revealed a need for the activity of the Mdm2-X complex in cancer cells undergoing ferroptosis. We also show that the Mdm2-X complex is able to facilitate ferroptosis independent of p53 thereby expanding the role of this complex in cancer, outside the realm of p53.

# Student Research Presentations

**2:15 – 2:30**    **Joint representation of spatial and phonetic features in human auditory cortex**

**Prachi Patel, *Electrical Engineering***

When listening to speech, an important task of the human auditory cortex is to process the message and simultaneously determine the location of a speaker in space. Previous studies in humans have identified several auditory cortical areas involved in processing the linguistic features of speech and spatial content of sound; however, how these areas represent both spatial and linguistic cues remains speculative. We recorded from human subjects implanted bilaterally with depth electrodes in perisylvian brain areas as they listened to naturalistic speech from five different directions. We found evidence for local and joint selectivity to spatial and spectrotemporal features of speech in the high-gamma band of the neural responses, resulting in a representation rich enough to enable successful decoding of both spatial and linguistic information. We found that the organization of neural responses to spatial and spectrotemporal features are largely independent, with no apparent correlation between the two. Furthermore, we found that the location of speaker does not change the spectrotemporal tuning of electrodes, but it modulates the baseline activity of neural responses. Our findings contribute to defining the functional organization of responses in the human auditory cortex, with implications for more accurate neurophysiological models of speech processing in the human brain.

# Student Research Presentations

## 2:30 – How Regulatory Mode Influences Workplace Discrimination

2:45 Dana Kanze, *Buissness School*

Despite concerted efforts to enforce ethical standards and promote diversity, workplace discrimination continues to plague US corporations. This paper investigates whether the way in which a corporation pursues its goals can influence its involvement in discrimination. We test this hypothesis among franchise corporations, which employ a considerable amount of low-income workers most adversely affected by discrimination. Drawing upon Regulatory Mode Theory, we perform a linguistic analysis of franchise mission statements to determine their degree of locomotion and assessment language. Based on archival data of Equal Employment Opportunity Commission settlements over the past decade, our findings reveal that regulatory mode predicts franchise involvement in discrimination activity. Higher levels of discrimination are associated with franchises whose mission statements motivate employees to swiftly “just do it” (locomotion mode) rather than thoughtfully “do the right thing” (assessment mode). By manipulating the regulatory mode of franchise mission statements, an experiment reveals that participants exposed to high locomotion and low assessment mission statements tend to disregard ethical standards, making significantly more discriminatory managerial decisions than those exposed to low locomotion and high assessment mission statements. Collectively, our results suggest that companies can reduce their exposure to discrimination by minimizing the regulatory mode predominance (locomotion minus assessment) of their motivational messaging.

# Poster Session

1. From First Meeting to Marriage: Mate Sorting and Marital Satisfaction in China - **Bao Kangxin**
2. Lower Perceived Competence Predicts Higher Staff Learning through Web-Based Modules - **Felicia Hardi**
3. Towards lidar-based mapping of tree age at the Forest Tundra Ecotone - **Johanna Jensen**
4. Humans vs. Machines: Who Knows Us Better? Understanding Personality Judgment Using Facebook Data and Machine - Learning Algorithms - **Hana Konradova**
5. Spatial Pattern Analysis of Community Acceptance and Wind Energy Production in Texas – **Veronica Lee**
6. Culturing conditions in the maturation of human iPSC-derived cardiomyocytes for cardiac tissue engineering - **Sara Seidelin Majidi**
7. China’s FDI Pattern and Trading Effects in the Belt and Road Range – **Junyu Meng**
8. Investigating T cell function in tumors at the single cell level – **Samhita Rao**
9. Safer Elections and Women Turnout: Evidence from India – **Divya Singh**
10. Design, Synthesis, and Evaluation of Highly Potent Linker-Equipped Analogs of Spongistatin 1 for Targeted Delivery Approaches - **Makeda Tekle-Smith**
11. Identifying vocal-motor behaviors of joint engagement in parents and children with autism spectrum disorder – **Natasha Yamane**

# Poster Session

## **From First Meeting to Marriage: Mate Sorting and Marital Satisfaction in China**

**Kangxin Bao, *Quantitative Methods in the Social Sciences***

The research aimed to find out the relationship between ways of first meeting and marital satisfaction between married couples, with attitudes towards social status of male and female as the intermediate variable. The nationwide cross-sectional survey data was used. To test the relationship, the study adopted linear regression, ordinal logistic and mixed effects models. It was found that meeting through the couple themselves led to higher marital satisfaction than through arranged meeting by parents. But first meeting form was not a dominating factor compared to attitudes toward male and female's social status, the mediator, which suggested that sociocultural context was indirectly correlated with marital processes. Also, it is interesting to notice that females tended to be more influenced by the first meeting than males concerning marital satisfaction though it was not so significant within pairs. Further studies can be done on the meso level.

## **Towards lidar-based mapping of tree age at the Forest Tundra Ecotone**

**Johanna Jensen, *Ecology, Evolution and Environmental Biology***

Climate change may cause spatial shifts in the forest-tundra ecotone (FTE). To improve our ability to study these spatial shifts, information on tree demography along the FTE is needed. The objective of this study was to assess the suitability of lidar derived tree heights as a surrogate for tree age. We calculated individual tree age from 62 tree cores collected at basal height from white spruce (*Picea glauca*) within the FTE in northern Alaska. Tree height was obtained from terrestrial lidar scans (<1cm spatial resolution). The relationship between age and height was examined using a linear regression model. We found a very strong predictive relationship between tree height and age ( $R^2 = 0.6951$ ,  $RMSE = 29.32$  years) for trees that ranged between 14 to 230 years old and 0.29 to 15.2 m tall. Regression models were also developed for small (height < 3 m) and large trees (height  $\geq 3$  m), however, these models captured less variance in the data ( $R^2 = 0.4292$ ,  $RMSE = 14.05$  years and  $R^2 = 0.2383$ ,  $RMSE = 41.15$  years, respectively). Although a strong, predictive relationship between age and height is uncommon in light-limited forest environments, we hypothesize that the sparseness of trees within the FTE may explain the strong tree height-age relationships found herein. Using this relationship and tree height extracted from an individual tree detection algorithm (Silva et al., in review), we predicted age for six 2,500 m<sup>2</sup> plots within white spruce (*Picea glauca*) stands previously determined to be along the FTE. From these predictions, we generated age distributions to assess population dynamics. Age distributions show substantially fewer trees which are <40 years old with increasing latitude. Further analysis of 36 additional tree cores recently collected within the FTE near Inuvik, Canada will be performed. Our analysis suggests that lidar derived tree height could be a reliable proxy for tree age at the FTE, thereby establishing a new technique for scaling tree structure and demographics across larger portions of this sensitive ecotone.

# Poster Session

## **Lower Perceived Competence Predicts Higher Staff Learning through Web-Based Modules**

**Felicia Hardi, *Psychology***

Online self-paced training has been adopted by a wide range of institutions as a medium to build relevant skills and knowledge, particularly for new hires in the workplace. However, assessment of characteristics influencing its effectiveness has been largely inconclusive. Furthermore, the impact of perceived competence in a self-paced online training has been primarily unstudied. To address this gap in knowledge, we sought to investigate factors that would support self-paced online training in the workplace. 125 juvenile probation officers in 10 sites across 3 states completed a training on youth behavioral health risks, outcomes, and screening to improve their understanding of officers' role in identifying mental health risk in youth and linking them to behavioral health services when needed. Training is comprised of 4 self-paced sessions administered online within a specified time frame. Prior to training, participants completed a staff survey measuring organizational characteristics and a pre-training test on their current behavioral health knowledge. Knowledge acquisition was measured by the change in test scores pre and post training. Results show that staff who rated themselves as less competent in screening and referral practices prior to training were more likely to increase their behavioral health knowledge post training. Furthermore, lower perceived job competence significantly predicts higher learning when controlling for pre-training scores, education level, and geographical location. This finding contradicts much of the literature about the effect of perceived competence on learning where higher competence has been found to be related to higher intrinsic motivation, which subsequently leads to higher degree of learning in the classroom. This discrepancy suggests that the mechanism of self-paced learning out of the classroom may be different than didactic learning in the classroom. Whilst children in schools may be selectively more intrinsically motivated to expend efforts in learning subjects that they believed to be their academic strengths, this study suggests that adults in the workplace may be more inclined to attend to trainings that would improve their knowledge in subjects that they are less informed about. With increasing popularity of online training in multitude of settings, further investigations are needed to examine how to encourage motivation and improve learning through self-paced web-based administration.

# Poster Session

## **China's FDI Pattern and Trading Effects in the Belt and Road Range**

**Junyu Meng, *Quantitative Methods in the Social Sciences***

China's FDI within the Belt and Road area has caught the world's eye. This thesis focuses on the determining factors of China's FDI flow within the Belt and Road area by building the generated gravity model. Through the analysis of panel data of 64 relevant countries from 2003 to 2016, this research structured the relationships between China's FDI flow and major determining factors. After pooled regression model and Hausman test, the fixed effects estimator model was established. And the results show that the market size, GDP and infrastructures are positively correlated with China's FDI flow, while labor costs and trade barriers are negatively correlated with flow of FDI. So there is no trading substitute effects for this survey. And this research is helpful to finding the laws of FDI within this area and offering some policy advice.

# Poster Session

## **Humans vs. Machines: Who Knows Us Better? Understanding Personality Judgment Using Facebook Data and Machine - Learning Algorithms**

**Hana Konradova, *Quantitative Methods in the Social Sciences***

Although current research indicates that humans are capable of satisfactory personality judgments even with a limited amount of information, recent studies also suggest that humans can be easily outperformed by computers that use automated algorithms to estimate our personality characteristics based on our digital footprint, which poses significant challenges for keeping our sensitive information private. First, this study attempts to replicate this claim and determine to what extent, if any, computers provide higher judgment accuracy for Big Five personality traits (openness, conscientiousness, extroversion, agreeableness, neuroticism). For assessing the accuracy of computer-based judgment, we use self-other agreement between self-reported psychometric assessment and machine-learning algorithms. Supervised learning techniques based on least absolute shrinkage and selection operator (LASSO) and ridge regression are trained on Facebook likes in two forms: raw data (17,128 Facebook likes-predictors) and dimensionality-reduced data using singular value decomposition (100 predictors) or latent Dirichlet allocation (600 predictors); the resulting predictive models are compared according to their judgment accuracy. Human judgment is gauged by a Facebook friend's rating on the Big Five traits. Second, we seek to understand what behavioral and/or social patterns lie behind lower or higher judgment accuracy in both types of judgement in question. Family ties, demographic characteristics, personality of the observer, the trait being observed, or social network characteristics of the subjects are considered for this purpose. To answer the questions, data from myPersonality, a Facebook application that allowed Facebook users to take psychometric tests and stored information about their profiles, is analyzed. Results indeed suggest that automated algorithms, on average, provide significantly more accurate personality judgment than an average person in our sample, provided they have a sufficient amount of Facebook likes to work with. This is true even for high visibility traits, such as extroversion. Existence of family ties boosts the overall judgment accuracy significantly for the human judgment, and so does similarity between the subjects as well as personality characteristics of the target, mainly high openness and low neuroticism. Big Five traits of the target seem to be even more important for the accuracy of computer-based judgment, suggesting there exists a type of personality that is more "readable" for computer algorithms, making such people more vulnerable in terms of potential manipulation and misuses of their information. This has consequential implications for keeping our sensitive information private in the online environment, yet little research is available directly on this topic, which makes our findings an important piece to the discussion about automated personality recognition.

# Poster Session

## **Spatial Pattern Analysis of Community Acceptance and Wind Energy Production in Texas** **Veronica Lee, *Quantitative Methods in the Social Sciences***

Although the United States is the leading global wind energy generator and a national public opinion supports wind energy development, most new wind farm proposals encounter local opposition, concerning potential danger or unpleasant change in the local community. Community acceptance is the major challenge for wind power development, few prior studies however focused on the community acceptance of the wind energy farm. This study hypothesizes that the local community with high wellbeing and health care indicators would have lower community acceptance of wind farm and specifically interests in Texas, where dominantly produces the most wind power in the nation. Using geological data of the commercial wind farms provided by the U.S. Geological Survey, US health indicator spatial data set provided by Columbia University, and the County Health Rankings survey answered by the residents offered by the University of Wisconsin Population Health Institute for Texas in 2015, this study implements Local Indicators of Spatial Association (LISA) statistics to perform the Hotspot (Getis-Ord  $G_i^*$ ) and Clusters (Moran's I) analyses on commercial wind farms and local quality of wellbeing, and visualize their distribution to a map of Texas. Then, this study runs OLS (Ordinary Least Squares) and spatial-error regression models to test the hypothesized inverse spatial relationship between the community acceptance and the wind farm distribution, by defining the local wellbeing or health care indicator as the dependent variable and the commercial wind farm distribution as the independent variable. As a result, this study determines the spatial congruity of commercial wind production in the local community with low wellbeing and health indicators. While both OLS and Spatial-error regression analyses drawn for the inverse relationship between the community acceptance of the local community with high wellbeing and health care indicators and wind farm distribution, both regression models had r-squared value larger than 0.005 that they failed to reject the null hypothesis. Findings of this study highlight some congruity of the community acceptance and wind energy distribution in Texas and encourages the future continual research on the spatial relationship between local community acceptance and wind energy production in the United States to mitigate the local opposition of the wind power development.

# Poster Session

## **Design, Synthesis, and Evaluation of Highly Potent Linker-Equipped Analogs of Spongistatin 1 for Targeted Delivery Approaches**

**Makeda Tekle-Smith, *Chemistry***

Antibody-drug conjugates (ADCs) target tumor-specific antigens, thereby selectively delivering their cytotoxic payload to the cancer cells. The three most basic requirements for a drug to be developed as an ADC payload are: 1) sub-nanomolar potency with a known mechanism of action, 2) access to a supply of the compound either from natural sources or by chemical synthesis, and 3) a functional group that can be used in selective conjugation reactions, located in a region of the molecule that is not critical for activity such that chemical modification does not result in any significant loss of potency. With an average GI 50 Value against the NCI panel of 60 human cancer cell lines of 0.12 nM and demonstrated in vivo efficacy in various mouse models, spongistatin 1 is an attractive candidate for development and evaluation as the drug component of ADCs and other selective cancer cell-targeting conjugates, however it is not available from natural sources, and it does not have a functional group that can serve as a synthetically selective and pharmacologically innocent linker attachment point. By developing new and more efficient synthetic methods and by rationally designing a structurally simplified analog, we have devised a 22-step synthesis of an azide linker-equipped analog of spongistatin 1 that is nearly equipotent with the natural product.

# Poster Session

## Culturing conditions in the maturation of human iPSC-derived cardiomyocytes for cardiac tissue engineering

**Sara Seidelin Majidi, *Engineering***

An increasing need for tissue engineering and regenerative medicine is emerging. Worldwide, unavailability of donors and transplants is an increasing problem. Therefore, the need to engineer tissue is urgent. The field of tissue engineering is highly interdisciplinary, where knowledge from traditional subjects like molecular biology, polymer chemistry, anatomy, medicine etc. is applied.

Coronary heart diseases, such as myocardial infarct (MI), are the leading cause of death worldwide. Therefore, the need for regenerative medicine and biomaterials in the treatment of heart diseases is important. When the heart undergoes an injury and the tissue is weakened or lost there are limited possibilities for the heart to regenerate the tissue on its own. This might result in life-threatening diseases and possibly heart failure.

The anisotropic property of the cardiac tissue is an important factor to consider in the design of biomaterials for cardiovascular tissue engineering. The natural tissue of the heart has a distinctive fiber orientation in which gap junctions between the cells provide electrical connections to assure synchronized contractions stimulated by electroactive potentials. A MI can potentially lead to the rearrangement of the ECM structure, thereby affecting the properties of the myocardium. Electrospinning provides a simple and inexpensive method for nanofiber fabrication, where anisotropic features can be incorporated.

The aim of this study was to establish a method for fabrication of biomaterials for cardiovascular tissue engineering. Furthermore, the aim was to establish a method for maintenance and maturation of human iPSC-derived ventricular cardiomyocytes (iPSC-CM).

Electrospinning was used to fabricate aligned PCL-, PCL/gelatin-, and PCL/GO/gC3N4 nanofiber meshes. The fabricated scaffolds were analyzed with a tensile test to investigate the Young's modulus. Furthermore, the different scaffolds were seeded with a mono-culture of iPSC-CM. A hydrogel was included on one of the PCL samples to investigate how this would affect the maturation of iPSC-CM. Additionally, two co-culture setups were established by seeding iPSC-CM and fluorescent mesenchymal stem cells in a mixed or layered condition. Moreover, the aim of this study was to monitor beating of the iPSC-CM during 11 days in culture.

Results showed that the wanted alignment was obtained in the PCL/gelatin fiber mesh. Furthermore, the results showed that the Young's modulus for the three fiber meshes were significantly different. The PCL/GO/gC3N4 demonstrated a Young's modulus of  $18.71 \pm 5.32$  kPa, which resembles the *in vivo* settings the best.

The results from the mono-culture of iPSC-CM indicates that this method did not support cardiomyocyte maturation. Moreover, the results showed that the hydrogel inhibited iPSC-CM spreading and maturation.

A method for co-culturing iPSC-CM and mesenchymal stem cells was established. Here, the layer by layer method proved the most promising for cardiovascular tissue engineering. However, further experiments need to be conducted before a final conclusion can be reached. Finally, beating of iPSC-CM was obtained after 4 days in culture.

Further investigation and optimization studies are needed. However, the work presented here could lay the foundation for more advanced cardiac tissue engineering such as development of cardiac patches.

# Poster Session

## Investigating T cell function in tumors at the single cell level

**Samhita Rao, *Microbiology and Immunology***

Cancer immunotherapy relies on the ability of the adaptive immune system, specifically T cells, to recognize tumor-associated antigens and hence reject tumors. But, even with great success in the clinic, immunotherapy does not work in all cancers and not all patients respond predictably to it. Many questions about the mechanisms through which T cells act on tumors are still unanswered. Being one of the most diverse immune cells in the body, we now appreciate that T cells are involved in tumor immunity. But we do not completely understand how they are involved, or their exact function in tumor immunity, be it positive or negative. This points to the critical need of an in-depth characterization of T cells in solid tumors.

My objective is to identify tumor-specific T cells and test their therapeutic potential in vivo. I propose that immunotherapy fails because T cells with anti-tumor potential are unable to carry out their anti-tumor functions. To this end, I hypothesize that T cells within a tumor have diverse functions: pro and anti-cancer. These functionally diverse T cells will respond to immunotherapy differently. I explored T cell receptor phenotypes in mouse tumors and tracked changes in T cell phenotypes in response to immunotherapy. We have developed a single-cell analysis pipeline to study up to 35 independent phenotypic parameters in single T cells. For each T cell, we obtain 1) TCR  $\alpha\beta$  sequence 2) cytokine and transcription factor expression and 3) cell surface marker expression. I have a unique opportunity to link T cell function with specificity at a single-cell level within a tumor, that may be masked in bulk analysis. I use murine adenocarcinoma tumors (MC38), an established mouse model of colorectal cancer, in C57BL6 mice. I have tracked TILs at the single-cell level before and after immunotherapy in mice and found distinct phenotypic changes in both CD4<sup>+</sup> and CD8<sup>+</sup> T cells. I propose that these could shed light on identifying T cells that can be therapeutically used to treat cancer.

Even with tremendous progress in the cancer immunotherapy, many basic immunological questions remain unanswered. My goal is to utilize novel approaches to investigate T cell function in tumor immunity and tolerance. My experiments will lay the foundation for future clinical research. This single-cell analysis will also provide hitherto unseen granularity in the biology of T cell function within a heterogeneous tumor microenvironment.

# Poster Session

## **Safer Elections and Women Turnout: Evidence from India**

**Divya Singh, *Economics***

World History provides many examples of elections coupled with violence. Nineteenth century English Voters found elections so threatening that some 'voluntarily' attempted to disenfranchise themselves. Elections in India have historically been associated with malpractices such as booth capturing, clientelism, vote buying, election violence. At the same time, participation of women in political and electoral process is limited. Credible causal evidence linking election malpractice and inadequate women participation is lacking. This paper looks at one particular measure of women political participation - women turnout in elections and points to poll booth safety during election as one possible reason for low women turnouts. For this purpose, I look at the effect of enhancing security at the polling booths during elections in India on turnout by gender. I find that turnout for women relative to men goes up when extra security is deployed at the polling booths. This translates in lower vote share of candidates belonging to incumbent party, female candidates and for re-contesting ministers with significant asset growth in office.

To provide credible causal estimates, I use regression discontinuity design that exploits strategy adopted by Indian central election authority in identifying booths that were subject to stringent security measures in elections post 2008. One of the criteria used for identifying 'critical' booths was: if more than 75% of votes cast in the polling booth in the past election were polled for one candidate. This allows me to compare booths just above the threshold with just below.

I combine election outcomes at the level of the polling booth with the characteristics of candidates to create a unique dataset of election outcomes at the level of the polling booth. The results suggest that electoral safety is an important driver of female voter participation. I find that increasing security at the polling booths increases women turnout by around 2-6 percentage points which is equivalent to 3000-9000 additional women votes per constituency. Additionally, there is no significant impact on male turnout.

Having established that women turnout in larger numbers when polling booths are subject to greater security, I show that political outcomes are affected such that they can be explained by larger women turnout. In particular, I look at the effect of extra security on vote share of candidates belonging to incumbent and challenger party, corrupt, criminal and female candidates. These are relevant margins to study since recent evidence has pointed out that women are more left-wing, anti-incumbent, anti corruption and anti-crime.

# Poster Session

## Identifying vocal-motor behaviors of joint engagement in parents and children with autism spectrum disorder

Natasha Yamane, *Counseling and Clinical Psychology*

Joint engagement (JE), the triadic arrangement between a parent and a child around a shared object or event, provides an important context for the development of social cognition. Impairments in joint engagement are commonly identified as a primary marker of children with autism spectrum disorder (ASD), a neurodevelopmental disorder of early onset characterized by social deficits. However, a majority of existing work on JE has used primarily *global measures* of social behaviors derived from prior work on joint attention skills. To address this limitation, the goals of the study were to: (1) develop the Vocal-Motor Coding System (VMCS) as a novel approach that integrates discrete motoric variables of **Proximity, Orientation, and Object-Touch**, as well as vocal variables of **Loudness and Rhythmicity** (i.e., vocalization, pause, and switching pause) to measure JE in parent-child interactions; (2) assess the criterion validity of the VMCS against established JE systems; and (3) test dyadic vocal-motor differences between dyads with typical development (TD) and ASD.

The VMCS was applied to code a joint-attention task completed by 20 parent-child dyads, including 10 with TD and 10 with ASD. Dyads were video-recorded as part of a larger study (PI: L. Naigles, University of Connecticut) that investigated longitudinal outcomes of expressive language development in children with ASD. Dyads were matched on child's age ( $M=41.0$  months,  $SD=3.5$ ) and sex (10M, 10F). Vocal-motor behaviors were coded by the first author who was blind to children's ages and diagnoses. The criterion validity of the VMCS was tested against established coding schemes for JE, revealing a number of significant correlations ( $p<0.05$ ) between motoric behaviors and child engagement states and between vocal behaviors and parental attention-directing strategies. Although no significant differences were found between vocal-motor behaviors of dyads with TD and ASD, we found strong associations within the ASD group among the frequencies and durations of dyadic motoric behaviors with parental vocal behaviors. Notably, dyadic proximal behavior was strongly related to parental vocal loudness ( $\rho=-0.90$ ), suggesting vocal loudness may be a strategy unique to parents of children with ASD in fostering JE.

Findings support the viability of the VMCS in coding JE using discrete vocal-motor measures, and point toward its utility in characterizing strategies used by parents to facilitate JE with their children. However, further studies are needed to clarify the effects of these parental strategies. To this end, this coding system may be useful as an outcome measure of changes in the context of parent-mediated interventions.

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