



The Department of Statistics presents the 4th Edition of

DEGREES OF FREEDOM

**AN
ODE
TO
THE
OUT
GOING**

NOTE BY OUR FACULTY ADVISOR

Dear readers,

My heartfelt gratitude goes out to the Union and Student Body of the Department of Statistics for their active participation in the organisation of all the events conducted during this academic year. I would also like to express my deep sense of appreciation for our faculty members for their involvement and cooperation. It has been a remarkable journey. I look forward to another year full of successful events and activities.

Warm regards,
Dr. Kailash Kumar,
Association In-Charge,
Department of Statistics

NOTE FROM THE UNION

Dear Readers,
We are glad to release the fourth and last edition of our newsletter, Degrees of Freedom, for this academic session. This has been an immensely exciting year for all of us in terms of what we have gained from our experiences and the contributions that have been made by the Editorial Team and the student body of the department. We are thankful to the Editorial Team for their efforts in making it possible to publish the newsletter on a quarterly basis. Degrees of Freedom gives the correspondents an opportunity to put forward their opinions on a variety of subjects, very different from statistics at times, to revive fresh conversations about important and different issues. We are thankful to the team for submitting some thought-provoking articles and covering each department event and activity efficiently. A special thanks the Editorial Team formed at the time of the Annual Academic Meet, Moments, for their commendable coverage of every event. We are thankful to Dr. Kailash Kumar, our Association In-Charge, for his constant support throughout the academic session. It would not have been possible to organize the events that we did without his guidance.



Last but not the least, we would like to thank each and every person who contributed in the smooth functioning of the department during our tenure. We've grown into better individuals post this academic year and the learning has been immense. We couldn't have asked for a better experience.

Warm regards,
Statistics Union, 2018-19

TALK HELD BY MR. UTKARSH AMITABH

"Choose the job you love, and you will never have to work a day in your life."

In a world with thousands of options, how to decide a career you love, a career that is right for you?

Today we students have a dizzying array of career choices which weren't available before. It is very exciting to have so many possibilities but at the same time it can also be stressful and overwhelming especially with people asking "What are you planning to do with your life?" Answering this question may seem insurmountable.

To address the problem faced by many students of having too many options in hand, the Department of Statistics, LSR, on the 8th of March, 2019, conducted an enlightening and informative talk on 'Careers in the Time of Artificial Intelligence' by Mr. Utkarsh Amitabh. He works at Microsoft and is the founder of Network Capital. He is a World Economic Forum global shaper, who represented the community at Davos. Mr. Amitabh's articles have been published by the World Economic Forum, Quartz, and other platforms.

He introduced the students to Network Capital, a global platform for students and young professionals seeking mentorship to help them develop career intelligence. This platform encourages democratising inspiration for meaningful careers. During the talk he focused attention on the paradox of choice and the importance of grit. It was an extremely enriching talk which had each and every student engaged till the very end.

- RHIA SAHNI



A HYPOTHETICAL EXPERIMENT

The mantis shrimp can perceive both polarized light and multispectral images; they have the most complex eye structures in the animal kingdom. Human eyes have color receptors for three colors (red, green, and blue); the mantis shrimp has receptors for sixteen types of color, enabling them to see a spectrum far beyond the capacity of the human brain. What might they be able to see that we cannot? What are we missing?

—Tess Moran, University of Chicago

This was a question posed by a University of Chicago student to his biology professor during one of their discussion classes. The professor then opened up the question to the entire world for any kind of answers. This is my attempt to answer it through this newsletter.

Hey Tess!

Your question is beautiful. I am destined to answer it. I am a manshtaur. Unlike a centaur, I do not descend from the mighty kingdom of the royal steed. Instead, I am half human and half mantis shrimp. My mom- a mantis, before her death, tried to nickname me by combining 'human' and 'mantis'. However, calling me 'hu-man' would have been a neglect of my shrimp-ness, while calling me 'man-man' would have been redundant. So, she just settled on my original name-Aarusterus, given by grandpa. Centaurs have the ability of human intelligence and speech. However, manshtaurus have much superior abilities. We can see things like human beings do, but we can also see things like mantis shrimps do. We have this flexibility of switching between the two visions, just by winking back to back twice. For the mantis shrimps, human flesh is transparent and the human bone translucent. However, human thoughts are visible. It's awesome to have a kind of photographic negative of the world, just winks away. You know what everybody thinks about everybody and can literally see people's emotions. Nobody can possibly hide anything, let alone lie to anyone. I had never been to an all-shrimps world. I wondered what 'unseen' might lie in their 'visibly glamorous' world. Dad says they can never control their appendages, so better stay away. He knows they would get furious, when they know that mom coupled herself with a human being. But his warnings can never stop my curiosity. After all, I am a brave manshtaur. I have nothing to fear when I have my armour- my own appendages! I sneaked into the deepest of the oceans and hid in Nanny-my grandmother's- house. Nanny truly loved me but hated some of my human manners. I knew this because I could see that (literally). There was no need of any dining table conversations, because we read each other's thoughts. It turns out I have a two year old cousin shrimp who could read perfectly. In fact mantis shrimps don't talk, they READ! I wonder how dad communicated with mom. After Nanny covered the human parts of my body, I was free to wander about the town. I found that the mantis shrimps have the most efficient bureaucracy and legal systems. The former does not require any paperwork, while the latter closes cases within minutes. How cool would it be if the human eyes could work this way? Apart from the efficiency of human government machinery, how uncomplicated would their societal relations become? No pretentiousness, no hiding of thoughts and emotions, and above all - no liars! Honestly, though I have the ability to have mantis shrimp vision even off-sea, I never wink twice in school to turn that mode on. It is not as if I never tried. It is just scary to know what people think about you. This power is not as amazing as it seems. Do you know, mantis shrimps are the most uncreative creatures on Earth? Imagine how your Wordsworth, Picasso or Shakespeare could have emerged if their thoughts were openly displayed. It is the way of translating thoughts into words and art which makes human beings special. This translation would be unnecessary if we could directly read these thoughts. Basically, it's no fun to be able to see beyond the capacity of any living being, when those abilities destroy the pleasure of living. Dear Tess, I believe that human beings are exposed to the widest spectrum possible: the spectrum which consists of freedom of thought and the freedom of expressing them selectively. Hope I will see myself in your thoughts.

Yours truly,

Aarusterus

A harmless manshtaur (seriously, my appendages are vestigial)

P.S. For more fun facts about my mom's kingdom, do visit:

https://theoatmeal.com/comics/mantis_shrimp

- AARUSHI SHARMA



SESSION HELD BY DR. S.M. BENDRE



Could you ever imagine that your decision to leave a job with a firm and join another is a decision which affects not only you and your family but the industry as a whole? This decision is the basis of a whole new field of analysis- attrition analysis.

The extremely informative session with the Associate Professor from the Indian Statistical Institute - Dr. S.M. Bendre dealt with some unconventional fields of study like the aforementioned. Dr. Bendre covered many other real life applications of Statistics like real time data analysis and natural language processing-- which as a matter of fact is a project on which she herself is working.

Elaborating my experience on the latter-- I personally never thought that the Google search engine has defects, thinking that the search engine's artificial intelligence is the epitome of human-robot similarity. However, Dr. Bendre's experience with this project made me realise that there is a whole new field unexplored by my imagination- natural language processing, which enables the computer-human interactions to become easier like one's natural language!

While explaining all the applications, she kept in mind to relate them with what undergraduate students majoring in Statistics study in regular classes . This was evident when she took up course-related topics and then linked them with her applicative ideas. Not only this, she also talked about interesting data science courses that the student body could take up along with the prescribed University syllabus.

Overall, the session familiarized us with the pool of possibilities our field of study possesses. However, more than that, Dr. Bendre's depth of thought, research initiatives and oratory skills set an inspiration for all of how well a woman like Dr. Bendre could do in STEM in spite of being considered an apparent minority gender in the field.

- AARUSHI SHARMA

THE IDENTITY OF A TERRORIST

"That's why you will never hear me mention his name. He is a terrorist, he is a criminal, he is an extremist. But he will, when I speak, be nameless." (New Zealand Prime Minister Jacinda Ardern in her speech to New Zealand's Parliament on March 19th, 2019) A week after the attack on two mosques in Christchurch, the New Zealand Prime Minister Jacinda Ardern denied the attacker the notoriety he sought through this attack. She did so by denying him his identity. She has received worldwide praise for her support of the Muslim community in New Zealand after the brutal massacre of 50 innocents immersed in their Friday Prayers in Christchurch. While surfing through the comments on a video of PM Ardern in a late night talk show, I was delighted to see a string of comments, mostly from Muslims of different nationalities, full of adoration and respect for her. One such comment from an Indian mentioned how he would be willing to lay down his life for her and her family. A lady from Pakistan mentioned how all the world leaders should learn from her example. Through her exceptional leadership skills, PM Ardern managed to unite her ethnically diverse country in the face of rising global extremism and intolerance. Post an event as malicious as the Christchurch attack, communal unrest in New Zealand could have attained a rather frightful form, had PM Ardern not intervened with her reassuring words, "They are New Zealand. They are us," in reference to the Muslim community there. She acknowledged the presence of such hateful and discriminatory extremism in New Zealand while assuring the Muslim community of the support of their country. We Indians aren't strangers to the growing communal unrest in our country. I cannot help but compare PM Ardern with the Leadership of our country over the years. We in India are far from achieving such progressive ideas of inclusiveness in the society. There is rampant emphasis by a section of people on Hindu nationalism and associated narratives which lend insidious support to the idea that Muslims are unwanted trouble-makers in our country. Earlier this month, while the country celebrated the festival of Holi, members of a Muslim family in Gurugram were attacked by a mob with hockey sticks and iron rods. Their crime? They were attacked for playing cricket on the street in front of their house. This case brings back memories of the infamous Dadri mob lynching of 2015 wherein a Muslim man was killed for suspicion of slaughtering a cow. In fact, prominent political leaders from all over the country had recalled "Vedic scriptures" that justify the murder of humans for slaughtering cows and an FIR was filed against the murdered and his grieving family, all of this without evidence of cow slaughter. It is alarming, to say the least, when democratically elected leaders defend the gross violation of human rights. A country's leadership is important in moulding public opinions and keeping a tight leash on such elements who profess discriminatory and unhealthy nationalism. The definition says Terrorism is the unlawful use of violence and intimidation, especially against civilians, in the pursuit of political aims. Terrorism has no caste, creed or religion. Despite this all-encompassing definition of terrorism, the word "terrorist" will invariably conjure the image of a brown, bearded man with an AK-47 in the minds of many. However, going by the definition of terrorism, aren't the gau-rakshaks with their janaus terrorists for hurting, intimidating and on some occasions, even murdering innocent Muslims? Isn't the attack on a crowd of people peacefully protesting the Unite the Right Rally in Charlottesville an act of terrorism by a white supremacist? Why is it that the term terrorism selectively includes the attack on our soldiers in Pulwama but not the subsequent attack on innocent Kashmiri students and shopkeepers all over the country? The blight of religious fanaticism, racial supremacy and intolerance is raising its ugly head all over the world. Extremist ideologies aren't simply limited to an environment of oppression, financial instability and illiteracy. They can take shape even in the best educated minds. Our country is teetering at the edge of disaster. The political leadership of India needs to address the issues of the oppressed and acknowledge that terrorism isn't specific to a certain community of people. They need to identify the root cause of the growing plague of terrorism in our country. Unless our leaders profess and practice inclusivity, instead of using communal prejudices to influence voters, our generation will be doomed to witness the persecution and oppression of millions of innocents in the name of nationalism.

-SHRUNATRA MISHRA



IS OUTLAWING MARITAL RAPE STILL A DISTANT DREAM IN INDIA?



or that consent is presumed/implied upon marriage. This understanding only legitimises the patriarchal notion that a woman is the property of her husband after marriage. A legally recognised model of consent will ensure that the husband is not left to make assumptions and will go miles in achieving gender equality in its true spirit.

- ANUNA BANNERJEE

Recently, MP Shashi Tharoor moved a private members' Bill in Parliament, seeking the criminalisation of marital rape. The government refused to even consider it. The ruling government's reactionary stand wherein they state that criminalising this repulsive act will "destabilise the institution of marriage" is highly problematic. Only 36 countries in the world, India being one, still refuse to see marital rape for the heinous crime it truly is, instead preferring to live in their self-created bubble of innate patriarchy. Marriage is still thought of as a socially sanctioned contract with no room for a woman's consent, especially in matters of intercourse, by a large chunk of the population. The government - upholders of our democracy, saviours of the minority, torchbearers for "equality"- refusing to even consider amending Section 375 of the IPC sheds light on how misunderstood the concept of consent truly is in our country. Law thus clearly validates the permissibility of marital rape and is reflective of the prevailing societal standards in India. It is essential to criminalise marital rape in order to break the age-old understanding that "marriage sanctions sex"

PREJUDICES AND STEREOTYPES

"I have a dream that my four little children will one day live in a nation where they will not be judged by the color of their skin but by the content of their character."

— Martin Luther King Jr.

It is unfortunate that prejudices against racial and ethnic minorities exist, and continue to flourish, despite the "informed" modern mind. Many people still dream of not being judged on the bases of their colour, race, caste, sex, religion, social class, etc but on the bases of who they are, their efforts, hardwork and determination.

From "maths is too tough for girls" and "men are so insensitive" to "he is getting a bit senile with age" or "black people struggle at university", there's no shortage of common cultural stereotypes and prejudices about social groups.

Prejudice and stereotype are not merely statements of opinion or belief, but they represent the attitude that includes feelings such as contempt, dislike, or loathing.

Journalist Walter Lippmann (1922) likened stereotypes to "pictures in the head," or mental reproductions of reality. It is an oversimplified generalization about groups of people. They may be positive or negative. In either case, the stereotype is a generalization that doesn't take individual differences into account.

Its effects are very robust and affect all stigmatised groups. False beliefs about the victims' abilities easily turn into a voices of self doubt which can have damaging effects on their actual performance. It is a disease of the society persisting from age to age which can be treated if we see people as individuals and not groups.

- RHIA SAHNI

IN CONVERSATION WITH DR. S.M. BENDRE



As students pursuing one of the most versatile and relevant subjects in today's world, we are woefully unaware of the strength and applications of Statistics. To complement our classroom education that teaches us the tools and tricks statistics, the Department of Statistics had invited an expert in the field of Applied Statistics to discuss how statistics can be applied in the industry. Dr. S.M. Bendre is a professor at the Indian Statistical Institute and had served as the Head of the Applied Statistics Department at ISI Tezpur. She has also worked as a Consultant Data Analyst with a Multi-National Company. In this interview with Dr. Bendre, we have tried to tap into her vast knowledge and find answers about the scope of statistics. Here are some excerpts from the conversation:

Applied Statistics is a very broad section of statistics with topics like SQC and the design of experiments. In this generation of artificial intelligence, how is applied statistics helping the industries and the corporate sector?

In the present world, dealing with information has become a crucial aspect of learning and data science has gained unprecedented importance. Applied statistics is a terminology used for a vast field of tools and techniques to model and analyse the data and extract meaningful answers to the queries raised. As a result, it is relevant wherever there is data and is already being used to a great extent in various sectors such as production, finance, banking, health care and so on. One can make an A to Z list of areas where applied statistics has contributed towards learning and scientific advances. Artificial Intelligence is about making the machines learn how tasks are to be performed, where learning is based on information. Statistics naturally has a huge role to play in the advancement of artificial intelligence.

You have immense experience in the corporate sector and in research as well. As undergraduate students, we have a tough time figuring out what we should pursue in the future. How are these work environments different and what, according to you, can help students make a choice?

I believe that in the current scenario, the students with formal training in statistics have tremendous scope and advantages as there are multiple possibilities and opportunities for them. Depending on your choice and preferences, you can pursue a career in academics, industry or the corporate sector. One suggestion is to gain more knowledge by completing a post-graduate course in statistics or a formal training in data science. Whatever you choose, it is very important to have sufficient expertise in tools for statistical computations such as R and Python. The work environment is a matter of personal preference and an environment one is happy with may not suit the other.

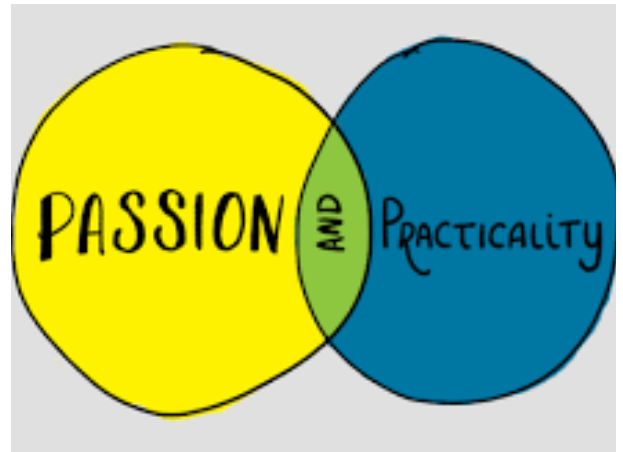
The Department of Statistics, LSR is honoured to have you amongst us today. How has your experience in LSR been and what message do you have for the student body?

I was equally honoured to get the opportunity to visit the Department of Statistics, LSR and interact with the bright and curious young minds. It was a real pleasure talking to the students and addressing their queries. I was also impressed to notice the multi-spherical activities students are involved in and the encouragement they get from the college. My message to each one of you is simple: follow your dreams. Do not get deterred by the circumstances and mental blocks and pursue your goals. Not all of you are probably clear what your goals are right now but if you are sincerely doing whatever it is that you're doing, you will soon find out what excites you and what motivates you. Make a choice and try to excel- put your best foot forward, one step at a time.

PASSION VERSUS PRACTICALITY

"Follow your passion and you will be the happiest person on earth. Passion will help you turn impractical decisions into practical ones." This is one side of the coin. Now let's hear the other side too. "Be practical and you will find your passion. Passion is an illusion to distract you from the major goals that are achievable in your life. Stay practical and the need to be passionate will vanish."

This trade-off makes us feel as if we are the rope used in the tug of war and our breaking point may arrive anytime soon. In real life, are we really allowed to break? No, we aren't. In a society where there are closely knit relations and people have expectations from each other and from themselves, breaking is not an option. To not make a choice between the two, is not a choice. Making a choice is mandatory. Despite being unclear about what you really want, you might be asked to make a choice between passion and practicality. Some people might say that they never had an impractical passion to be worried about while others might have to face the problem every day. The question still remains about the secret behind the right decision making, the strategy that one should apply so as to make the safest choice. Quest for the ultimate success mantra might cost you the



major battle of your life wherein your goal is to be happy. Play it by the ear. Being prepared for situations is good but preparing for the preparations will make you worried. If you believe that you have the skill and motivation of converting an impractical passion into a practical one, go for it. Nothing called impractical really exists, but yes, something yet to be discovered by you might probably exist.

- RISHU JAIN

SUCCESSFUL INVESTMENT - LUCK OR A PLAY AT NUMBERS ?



Returns ultimately are the goal of investment. This too can be calculated using the 'Sharpe Ratio' which takes into account risks also so as to arrive at the most accurate figure possible. Ultimately, I think it's safe to conclude that only fools depend on luck and if you're not one you'll depend on a smart statistician!

- AREENA MAKKER

The probability that a statistician buys a lottery ticket is zero. Just kidding. However, considering the fact that the chance of winning the jackpot is about 1 in 176 million, the statement will hold to be true for most statisticians. After all, luck is a mythical concept, right? So instead of spending that money on a lottery ticket, a statistician would rather invest it. You'd probably ask what a statistician would know about investing. For starters, while building an investment portfolio, one has to look for diversified stocks. The stocks that one chooses aren't selected randomly but are based on the correlation between them. Correlation establishes a linear relationship between any two variables. Usually, for risk minimization, stocks that are negatively correlated (i.e. if the value one variable increases, the value of the other decreases) are chosen keeping in mind the possibility of a market crash or high volatility of one of the stocks. Another thing that a person is interested in knowing before making an investment in a stock is the volatility of the stock or the fluctuations in its price. The simple statistical tool of standard deviation can be used to help make decisions in this regard. Standard deviation basically measures the average amount by which individual data points differ from the mean. The larger the volatility of a stock, the larger its standard deviation will be. Obviously, you will also be interested in knowing the returns from your investment.

MY RELATIONSHIP WITH NATURE

"The poetry of the earth is never dead." This beautiful set of words triggers my imagination and reminds me of all the picturesque views that I have been lucky enough to lay my eyes on. John Keats' words, to me are a ray of hope. The poetry of nature lies not only in the buzzing of the bees or the sound of the fresh water flowing in the river, it lies in every blade of grass, every grain of sand and every flower that blooms. It is in the air, in all the trees, every drop of rain and every ray of sunlight. And Keats here instills in us the faith to keep this poetry alive. The music, the poetry and the essence of the natural wonders on this planet will always be around us, in some or the other way. Being an Army Brat, I have seen, from the beautiful tea gardens of West Bengal to the scenic Backwaters of Kerala, from the snow-tipped mountains in Kashmir to the wonderland in the heart of Thar. Recounting these beautiful memories, I realize that not enough is done to keep these gifts of God, in a state that they deserve to be in. We all should make an effort to at least love and maintain these boons and not consume more than the Earth can replace.

- TANVI ANAND

BY OUR VERY OWN SENIORS

I still remember my first day in college and the orientation of my department. I was so nervous and scared. I thought I would never fit in, but LSR, as a whole, accepted me and made these 3 years memorable. It is such an honour to be a part of LSR, especially the statistics department. It was hard but it made me strong in a way. Now I feel that if I have been able to manage 3 years of stats, I can manage anything in life. (Laughs) for real though.

P.S.- I would like to thank all my classmates/friends who I made lots of memories with. They helped me survive.

~ **Bhawna Chandra**

My journey of 3 years in LSR has not been less than a roller-coaster ride, teaching me how to deal with the ups and downs of life and make the best out of every phase. Though there were times when I was unsure whether I would be able to survive through it, now that I have, I wish I could start all over again! Thanks to LSR for giving me such amazing friends and beautiful memories to remember all my life.

~ **Priya Agarwal**

My life at LSR has been full of ups and downs and it continues to be the same even in these last few days of college. It's not easy to walk with a smile on my face with the constant tension and pressure running at the back of my head. These red walls have completely transformed me into a new person- a better version of myself who is an independent woman with a positive attitude towards everything, never giving up at any cost. Something that I still need to improve on is my punctuality, though it has improved a lot! I believe that everything happens for a reason in life and one should gain the most from every experience. I think I have utilized this opportunity of studying at LSR to the fullest. I still can't believe that my journey at LSR is about to end and that after a few days, I'll no longer be able to get my daily dose of laughter and inspiration from my friends, though we promise to stay in touch. Finally and most importantly, I'll not have to travel in the metro for long hours daily.

~ **Nitika Verma**

My journey in LSR has been quite stressful, truthfully speaking. The uncertainty of whether my physical presence in class would be enough to grant me attendance every morning surely added to the anxiety. By the end of the third year, practicals have become practically impossible to complete any time before the very last minute of submission. But, after reflecting upon all the stress that I go through on an everyday basis in this institution, I realize that my priority is not to ensure that my makeup is on point every day or that my clothes make me look good. My priorities are to ensure that I am striving every day to make my future better and that I am creating a path to success for myself while inculcating habits that will go a long way to make me disciplined and focused to help me achieve my endeavours. Today I realize what the "Magic of LSR" is; it is the magic that helps you understand who you are, to become the best version of yourself and to wake up to know that 'YOU CAN DO IT'.

~ **Rashi Murarka**

FROM THE EDITORS' DESK

Dear Readers,

The Editorial Core Team of the Department of Statistics, LSR, is proud to release the final edition of its quarterly newsletter "Degrees of Freedom" for this academic session. This edition of the newsletter includes a potpourri of interesting articles and facts for your enjoyment.

As the session comes to an end, it's time to bid farewell to our beloved final year students. As they leave their college after 3 years of joy, hard-work and fulfillment, we have tried to capture their thoughts in the newsletter as their way of saying goodbye. We wish them luck for their future endeavours!

We would like to thank the Faculty Members, our staff advisor Dr. Kailash Kumar and the Statistics Union (2018-19) for their support, guidance and cooperation. The Editorial Core Team would never be able to function efficiently without their encouragement. Finally, dear readers, we thank you for your unwavering love and valuable time.

Happy Reading!

The Editorial Core Team
Shrunatra Mishra
Tanvi Anand
Rajni Tolani