Journal of Data Science 23 (4), 695–715
October 2025

DOI: 10.6339/25-JDS1204
Data Science Conversation

A Journey of Wisdom and Impact: A Conversation with Dr. Xizhi Wu

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Abstract

Over the past three decades, the discipline of statistics has undergone profound transformation, driven by the rapid emergence of data science and artificial intelligence. These developments have reshaped methodological paradigms and introduced new challenges and opportunities for statistical education, particularly in China. In this context, Professor Xizhi Wu from the School of Statistics at Renmin University of China has remained closely engaged with the evolving landscape, demonstrating keen insight and a forward-looking perspective. Through sustained contributions to teaching, research, and educational reform, Professor Wu has deeply influenced generations of students and educators, playing a pivotal role in the advancement of statistical education. To document and reflect on this legacy, the Capital of Statistics conducted an in-depth interview with Professor Wu, focusing on his academic trajectory, professional contributions, and perspectives on the future of the discipline. The conversation also recounts meaningful interactions with his students, offering a multidimensional portrait of a life devoted to statistics.

Keywords *data science; statistical application; statistical education*

1 Introduction

Dr. Xizhi Wu is renowned for his lasting contributions to statistics and higher education in China. A retired professor at the School of Statistics, Renmin University of China, he was born in Chengdu, China, in 1944, during the Anti-Japanese War. He was admitted to Peking University in 1963 to study mechanics. After graduating from Peking University in 1970, amid the so-called Socialist Education Movement, he was assigned to work in Derong County, Ganzi Prefecture, Sichuan. He stayed there for almost 6 years, doing all kinds of farm work. Throughout this period, he persisted in teaching himself mathematics and English. In 1976, he left Derong and returned to Nankai University in Tianjin, where he took up a teaching position. In 1982, he went to the United States for further studies. He earned his Ph.D. from the University of North Carolina at Chapel Hill in 1987. After graduating, he taught at many institutions, including UC Berkeley, UNC Chapel Hill, Nankai University, Renmin University of China, and Peking University.

Professor Wu's body of work reflects both scholarly rigor and a commitment to modernizing statistical education, particularly through research, authorship, and curriculum development. He has published a number of research articles in both international and domestic academic jour-

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Received October 7, 2025; Accepted October 16, 2025

Figure 1: Dr. Wu during the interview at Renmin University of China, Beijing.

nals, authored almost 40 monographs and textbooks (including revised editions), and translated 3 additional scholarly works and textbooks. Prof. Wu was at the forefront of incorporating modern statistical computing into the curriculum for statistics students. The textbooks he authored emphasize on understanding statistical methods through statistical thinking and practical implementation with open-source tools, rather than abstract theories and derivations.

Even in retirement, Professor Wu continues to shape the discipline through active teaching and mentorship, extending his influence across generations of statisticians. He teaches statistical computing, machine learning, and deep learning at numerous institutions—particularly in remote regions—playing a pivotal role in advancing data science education within the national statistical community. Prof. Wu's visionary leadership has deeply influenced generations of scholars. His students and mentees now occupy prominent positions as international leaders in statistics and data science, serving an enduring testament to his intellectual legacy. Prof. Wu's influence continues to inspire the evolution of these disciplines within China and beyond.

COS is a professional, humanistic, and integrity-driven data science community founded in China, dedicated to advancing statistical methodologies and their interdisciplinary applications. As a hub for researchers and practitioners, it bridges academic rigor with real-world problem-solving through knowledge sharing, open-source collaboration, and public education.

We had the pleasure of conducting an interview and preparing an edited, expanded version (see Figure 1). The outline of this article is as follows. Section 2 presents our conversation with Dr. Wu, chronicling his personal and professional trajectory from childhood through adolescence to his eventual appointment as a university professor. Section 3 presents Dr. Wu's insights on statistical education, statistics, and data science, while Section 4 features reflections from his former students. Section 5 concludes with our own comments. In the interview section, abbreviated names are used. COS and Dr. Wu stand for Capital of Statistics (where we are from) and Dr. Xizhi Wu, respectively. At places in the conversation, we added brief annotations via Remark.

2 Chronography

Dr. Wu's remarkable journey encompasses both significant personal growth and professional accomplishments. In our conversation, we examined how historical circumstances influenced his development.

2.1 Childhood and College Years

COS: *Could you share with us your early life experiences, particularly how your birth and childhood during the wartime period shaped your formative years?*
Dr. Wu: I was born in Chengdu in 1944 during the Anti-Japanese War, when my father was teaching at Sichuan University. Following Japan's surrender in 1945, my family relocated from Chengdu to Tianjin in 1946. I embarked on my educational journey quite early, and my family fostered an environment of considerable freedom for my upbringing. Despite being under five years old, I enrolled in primary school; however, my mother considered me too young and permitted me to repeat the second grade for an additional year, which left me one year behind my peers. Furthermore, during my junior high school years, I had to take another one-year medical leave of absence due to poor health.
COS: *What was your educational experience like during your childhood?*
Dr. Wu: When I was young, my family led a busy life as both my parents were teachers (see Figure 2). They granted me a great deal of autonomy and never once enforced the notion of "You must study hard and complete your homework" upon me. If they had, it would have felt more like their expectation than my own desire. Throughout my school days, I refrained from sharing school-related matters with my family, believing that these were issues I ought to manage on my own.
COS: *This educational approach nurtured a sense of independence within you, didn't it?*
Dr. Wu: Absolutely, I was highly independent. My parents adopted a hands-off approach to my education, enabling me to manage my studies entirely by myself. My education was completely self-directed—I could study when I wished, or choose not to at all. Furthermore, I have always had a certain impatience by nature. For example, whenever homework was assigned, I had an urgent need to complete it immediately and then proceed without any lingering concerns. I have

Figure 2: Family portrait of Dr. Wu with his father, mother and elder brother in 1946.

Figure 3: Dr. Wu during his time at Peking University in 1968.

a tendency to execute tasks swiftly. This is precisely why I write books rapidly. I mentioned that I would submit the manuscript within a year, but in the end, I completed it in just six months.
COS: *When did you gain admission to university, and was it your own decision to pursue Mathematics and Mechanics at Peking University?*
Dr. Wu: I was admitted to Peking University in 1963. During that time, universities typically did not disclose individual grades, so I was unaware of my exact score. For the foreign language component, I opted for Russian. While attending Russian classes at Peking University, I discovered that my score for the college entrance exam was 90. I believed I had answered all questions correctly and should have scored a perfect 100.

The decision to study Mathematics at Peking University was entirely mine. My family did not interfere, nor did they know which major I had applied for. At that time, the application process was University-dependent, and applicants were required to list multiple majors for each university they applied to. Candidates were allowed to list only three departments per university, and applications had to be submitted before taking the entrance examination—a process that differed significantly from today's procedures. I listed three departments at Peking University as my top choices. Upon admission, students did not select a major until their second year. I ultimately chose to major in Mechanics, as its curriculum closely aligned with that of Mathematics. This organizational structure mirrored that of Moscow University, which similarly maintained a dedicated Department of Mathematics and Mechanics(see Figure 3).
COS: *Was it feasible to carry on with normal studies during that particular era?*
Dr. Wu: Upon enrolling in Mechanics, I found that the coursework in my second year closely resembled that of Mathematics. Nevertheless, as I progressed to my third year, many political movements seriously interfered with our studies. Consequently, we attended very few classes. From my junior year onward, students across various universities in Beijing, including administrators and faculty, were dispatched to the countryside for the so-called Socialist Education

Movement. I was sent to Ziyang, Sichuan, and stayed there for a full six months from arrival to departure. In the countryside of Ziyang, I did all kinds of farm work, and, one early spring, there were not enough buffaloes to plow the fields, three of us had to pull the plow ourselves. I even volunteered to be the "buffalo". Later, when I revisited the field, an elderly farmer recognized me and said, "I held the plow and used you to plow the field."

On our way back to Beijing from Sichuan, the Cultural Revolution began. During that tumultuous period, my parents were brutally persecuted, rendering me without a source of living expenses. I was fortunate to receive financial support from my father's former colleagues and friends, who generously provided funds to help sustain my livelihood during that difficult period.

COS: *When did you complete your studies?*

Dr. Wu: Our Mechanics major constituted a six-year academic program, extending from 1963 until March 1970—six and a half years in total. In 1969, as part of a broader national initiative, many institutions were relocated inland. Peking University maintained a facility in Hanzhong, Shaanxi, to which the Departments of Mechanics, Wireless, and Technical Physics were subsequently transferred. Upon graduation, all of us were dispatched to grassroots assignments, and regrettably, no graduation certificates were issued at that time. Fortunately, in 1980, we were retrospectively awarded our graduation certificates, issued in the form of compact red booklets.

2.2 Derong County

COS: *Where were you posted after graduation?*

Dr. Wu: After graduation, I was assigned to Ganzi Prefecture, Sichuan. Three days after receiving the assignment, I set off from Hanzhong. The first stop was Chengdu, where we waited for a bus to Ganzi. During our stay in Chengdu, we lodged at Caotang Temple and slept on the floor. After a few weeks, a truck came to pick us up. It was an open-top Liberation truck (a military-style transport vehicle widely used in China at the time). We loaded our luggage onto the truck, sat on top, and traveled across Erlang Mountain to Kangding, the capital of Ganzi Prefecture, and then were assigned to Derong County, the most remote county in Ganzi Prefecture.

Derong lay in an essentially isolated area. From Derong to Chengdu, one had to hike over two mountains, each nearly 4000 meters in elevation. It took four days to reach the neighboring Xiangcheng County. In Xiangcheng, the bus service operated just once per week. After the bus arrived, it took another four days to reach Kangding, staying overnight in different counties on the way, and then it took another two days to reach Chengdu.

COS: *What was your role in Derong County, and did you engage in any farming activities?*

Dr. Wu: Yes, I did engage in farm work while in Derong, but it was less strenuous compared to the agricultural labor I had previously performed in places such as Ziyang County.

At that time, Derong County was going to build a hydroelectric power station. The county had no electricity, roads, telephones, shops, hotels, restaurants, and almost no modern facilities. We were sent there to build the hydroelectric power station. Our initial task was to survey the water diversion channel. We taught ourselves surveying, electrical engineering, hydraulics, and other related subjects.

COS: *How did you acquire all that knowledge and skill?*

Dr. Wu: The county cultural center housed a rich collection of books, which became a valuable resource during my time there. I also had the opportunity to meet members of a physical exploration team stationed in the area. They generously shared their standardized recording

Figure 4: Dr. Wu and other Peking University graduates in Kangding, 1971 (left) and an evening scene of Derong county, 1971 (right).

techniques, which were far more detailed than the general methods used in geological surveys. From them, I learned how to measure canal dimensions and evaluate optimal locations for the hydropower station.

In addition, I studied extensively from electrical engineering manuals, gaining practical knowledge in areas such as pole installation, wire erection, and transformer setup. I also brought several personal books on topics such as differential equations and theoretical mechanics. Through self-directed study, I was able to compensate for many university courses I had not formally taken. While others spent their evenings in conversation or leisure, I focused on reading. Even during meetings, I often sat quietly in the back, working through problem after problem with determination.

The county also had a modest bookstore, where I came across a small English reader printed in the 1950s—a simplified volume of approximately 100 to 200 pages. I purchased the booklet and, relying on a pocket-sized English dictionary so limited it did not contain basic expressions, began to teach myself English. Using the phonetic symbols in the reader and approximating their pronunciation through Chinese Pinyin, I engaged in repeated readings until the dictionary itself became worn from constant use. Furthermore, I had me several English-language mathematics books. Although I had previously studied Russian, I fully immersed myself in learning English through this self-directed approach, gradually building proficiency through persistence and resourcefulness.

COS: *Did you successfully establish the hydropower station there?*

Dr. Wu: We installed a turbine pump to generate electricity, but there were no roads at the time, and many people had to carry the pump back with great effort. Later, we installed a transformer, which was able to generate electricity for several hours every night (see Figure 4). Later, we needed to upgrade to a turbine, but at that time, only a few factories in China produced turbines. I had to travel to Chongqing on business to buy a turbine, which took half a year, and all transportation—water, train, and road—had to rely on personal relationships. In the end, it took nearly a year to bring it back, and the quality was very poor. It was a difficult time. After we left, the county built roads and built new hydroelectric stations.

COS: *Were all your family members located in Tianjin? How did you keep in touch with them?*

Dr. Wu: During that period, my only means of communication with my parents was through

letters. My spouse, who was my girlfriend and a fellow student at Peking University, was also assigned there. After we decided to go to that county, four other Peking University graduates also went there.

COS: *Were your letters able to reach them?*

Dr. Wu: The letters always did arrive. There was only a minimal chance of them getting lost, although it usually took approximately a week. The postal system was relatively dependable. Upon hearing that high-pressure cookers were manufactured in Shenyang, I wrote to the factory to request one, and they kindly obliged. I sent the payment through postal remittance. Seeing that we had access to well cooked food, the Commerce Bureau also began to stock pressure cookers, and soon others in the community began using them.

COS: *You spent your youth in that particular location. How do you perceive its impact on your subsequent life?*

Dr. Wu: I don't care about many things anymore. I have witnessed everything. Fame and fortune are no longer important to me. Living in such a poor and difficult environment, I was still able to find the joy of life. In fact, I think that period of time was my happiest time. Take my experience of exploring the canal for example. I often had to sleep in the mountains with a quilt. It was not peaceful when I slept. Although the woods were relatively quiet during the day, at night, all kinds of sounds were heard everywhere, and it was difficult to distinguish the source of the sound. This was undoubtedly a challenge, but I felt extremely satisfied and happy.

2.3 Nankai University

COS: *How long did you reside in Derong County, and where did you go to work subsequently?*

Dr. Wu: I stayed in Derong until 1976, and then returned to Tianjin to teach mathematics at Nankai University. Initially, I taught the 1973 class of students (the so-called "Workers, Peasants and Soldiers Students"). After the Tangshan earthquake in 1976, Professor Guoding Hu organized a data analysis team of mathematics majors to analyze real data and commissioned us to collaborate with the China Earthquake Administration to study earthquake prediction methods. Hu Guoding (April 4, 1923–September 21, 2011) was a prominent Chinese mathematician, mathematics educator, and a pioneer in China's information theory research. We analyzed ground tilt data. At that time, China had introduced ground tilt meters, and many seismic stations were equipped with one. I led several students to various seismic stations to collect data, and all the data were recorded manually. These students showed extraordinary hands-on ability. We went to the Xiangshan Seismic Station in Beijing, the Yuxian Seismic Station in Hebei, the Yixian Seismic Station in Hebei, and the Jinci Seismic Station in Shanxi. This was my first contact with data analysis and computers.

COS: *Did this represent one of the pioneering efforts in data analysis within China?*

Dr. Wu: During that time, there were no statistics or computer science departments. We were the first group to delve into data analysis at Chinese universities(see Figure 5). Nankai University at that time had a transistor-based electronic computer, specifically the 108B model manufactured by Beijing Wired Electric Factory. This machine was enormous, larger than this room, and its functionality paled in comparison to even the least advanced smartphones of today. Programming required punching holes in paper tape, much like using a typewriter, to create binary code patterns that were then fed into the machine via photoelectric equipment. The ALGOL60 language was my tool of choice during that period, although it is no longer in use today. In 1976, I worked with ALGOL60, and eventually moved to FORTRAN 77. Once the code was prepared, we would input the data, and the output appeared as narrow-line printouts showing

Figure 5: Dr. Wu with his colleagues and students in Nankai University, 1991.

only numerical values. Careful planning was essential to comprehend them. Subsequently, I visited nearby Tianjin Normal University, which has a wide-line printer capable of producing much more organized and readable results. The difference was remarkable.

COS: *Did you ever attempt to apply your programs to earthquake prediction?*

Dr. Wu: Yes, we did attempt to use them for earthquake prediction, but we were unsuccessful. There was an instance when we thought we had made a prediction, but it turned out to be negligent mistake made by a student from the 1973 cohort. After punching holes in the paper tape, he may have inadvertently pressed on the punch machine, causing meaningless noise patterns to be punched automatically. Ultimately, we never achieved any successful predictions as the Tangshan earthquake occurred without any discernible precursors.

COS: *Prior to that, you hadn't had any experience with data analysis or statistics. So, could you share how your interest in this field first sparked?*

Dr. Wu: Data analysis fascinated me deeply. During that time, I had ample opportunity for self-study since there were few students and my teaching responsibilities were minimal. Occasionally, I gave lectures to external organizations. I immersed myself in studying topics such as probability theory, stochastic processes, real analysis, complex analysis, and even measure theory, tackling each problem carefully since there were no pre-made solutions available. Around the same period, my interest in programming began to develop. Computer programs are both rigorous and captivating. After mastering ALGOL60 and FORTRAN77, I picked up other languages such as PASCAL with relative ease because they share similar principles. In contrast, ALGOL60 was quite cumbersome with its numbered lines and frequent jumps between code locations. A single mistake could make it extremely difficult to trace and correct.

2.4 Going Abroad

COS: *How long did you stay at Nankai University, and did you eventually decide to venture overseas for further studies?*

Dr. Wu: I remained there until the end of 1982. During that period, there was a prevalent trend of pursuing advanced academic degrees, such as master's and doctoral programs. Initially, I was quite content with my role as a teacher. However, over time, I began to feel out of step with the times. Without a particularly specialized academic focus and lacking confidence in transitioning to another field, I made the decision to pursue further studies abroad. Subsequently,

Shiing-Shen Chern visited China and advised me to consider studying statistics, suggesting Berkeley as a potential destination. At that time, I received offers from both Berkeley and Columbia. However, Professor Samuel Kotz, who had previously visited Nankai, emphasized that the statistics department at the University of North Carolina at Chapel Hill (UNC) was superior, with a wealth of renowned professors. Consequently, I chose to attend UNC. Looking back, I have no regrets. Each institution has its own strengths, and UNC, in particular, was a very safe and welcoming environment.

COS: *You continued your studies there until you earned your Ph.D., right?*

Dr. Wu: Obtaining a Ph.D. was undoubtedly a formidable endeavor. When I joined the department, I was its first student from Mainland China, and there were only a handful of Chinese students scattered throughout the entire university, although Berkeley might have had a slightly larger presence. In my class of fifteen students, only two were Americans, while the rest came from diverse countries such as Greece, Italy, Denmark, and Algeria. Upon my arrival, I faced the challenge of not having a supervisor and had to navigate qualification exams. The coursework was heavily rooted in mathematics, in which I excelled. However, I struggled with using available software for statistical analysis and lacked a deep understanding of statistics. After successfully completing the qualification exams, I initially approached a supervisor specializing in data analysis, but unfortunately, he declined my request, opting instead to mentor two American students and not accepting any international candidates.

COS: *Who served as your supervisor during your academic journey?*

Dr. Wu: Prof. Gordon Simons was my supervisor. Although he may not be widely known, he originally made significant contributions in mathematics and once published four articles in a single issue of the *Annals of Statistics*. Are you familiar with Raymond Carroll, a recipient of the COPSS award? During his visit to Renmin University of China, he shared with me how remarkable my supervisor was. Carroll, who was once a young assistant professor at the University of North Carolina aspiring for tenure, found my supervisor to be exceptionally demanding and academically rigorous. Presenting a report to him was never an easy task; he would thoroughly quiz you until he was fully satisfied with your work. This intimidating demeanor struck fear into the hearts of many. When Carroll, as a newcomer, presented his report, my supervisor surprisingly didn't ask him any questions on the spot. However, he later took Carroll aside and suggested various changes to his report, noting that with these alterations, Carroll could publish several articles. Carroll ultimately published numerous outstanding articles as a result. He mentioned that under a different person, he might have kept those suggestions to himself. Carroll emphasized that my supervisor was indeed a great person.

COS: *What was your primary research area during that period, and when did you officially graduate?*

Dr. Wu: My research focus during that time was quite broad and could be encapsulated within the fields of stochastic processes, optimal stopping, Bayesian statistics, and sequential analysis. Furthermore, it incorporated aspects of differential equations, specifically differential equations that mirrored the heat equations in partial differential equations. This was a complex free boundary problem, making it somewhat difficult to neatly categorize my research. I arrived in North Carolina in December 1982 and began my studies there in the spring semester of 1983. By 1985, I had completed my thesis and even participated in some lecture presentations soon after. My supervisor then deemed me ready to graduate. As a result, in 1987, I successfully defended my thesis (Wu, 1987) and officially graduated.

Remark: During that period, Professor Wu published multiple articles in Bayes sequential testing (Simon et al., 1987), local influence for regression models (Wu and Luo, 1993), model

Figure 6: Dr. Wu with Norman L. Johnson, professor of statistics at UNC, 1995.

diagnostics (Tsai and Wu, 1990), and co-authored his first English book with Professor Norman L Johnson (see Figure 6) and Samuel Kotz (Johnson et al., 1993).
COS: *Did you pursue any teaching opportunities in the United States?*
Dr. Wu: No, I had already made the decision to return to China, so I did not apply for any teaching positions. While it is common to apply for tenure track jobs first, I did not intend to stay in the United States. After successfully defending my thesis, I sought to further enrich my experience and therefore accepted an invitation to join UC Davis as a postdoctoral researcher under the guidance of Dr. Chih-Ling Tsai. My work focused on statistical diagnostics, particularly regression diagnostics. During my tenure there, computers played a pivotal role, and I frequently engaged in programming using FORTRAN77. I remained at UC-Davis for one and a half years before returning to China in April 1989.

2.5 Renmin University of China

COS: *Upon returning to China, did you make your way back to Nankai University?*
Dr. Wu: My position at Nankai University remained open, enabling me to return easily when came back. After spending almost a decade at Nankai, I made the decision to relocate to Beijing in 1998 and joined the faculty at Renmin University of China.
COS: *How did you find the adjustment period after relocating to Beijing?*
Dr. Wu: During my time in Beijing, I resided in Xisanqi and made a daily 15-kilometer bicycle commute. I never used the bus or taxis for transportation.
COS: *You were among the pioneering professionals in data science in China during that time.*
Dr. Wu: In China, mathematics held a prominent position, while those involved in data processing and analysis, like ourselves, constituted a small fraction of the academic community. Traditional statistics heavily rely on mathematical assumptions. However, when it comes to real-world applications, these assumptions are often questionable. If the mathematical assumptions are questionable, then your entire conclusion, your p-values, and all other derived results would be called into doubt. Determining whether your results came from the data or from your assumptions is a constant challenge. For instance, if you assume a normal distribution, how can you tell whether it's your assumption that's flawed or your data that's inaccurate? The answer is unclear, rendering it unscientific because it lacks verifiability. Science should be falsifiable. But

Figure 7: Dr. Wu with his wife and students, 2011 (left) and Dr. Wu, Hadley Wickham and student organizers at the 7th R conference, 2014 (right).

how can you falsify mathematical assumptions? While mathematics cannot be negated, applying it in a logically flawed manner is undeniably incorrect.

COS: *You have been a steadfast advocate for the education and dissemination of open-source software, offering a plethora of courses and participating in the first R Conference.*

Dr. Wu: Indeed, I have taught several courses, one of which focused on the R language. Subsequently, students from the School of Statistics at Renmin University of China took the initiative to organize and launch the R Conference, executing it with remarkable proficiency. The conference embodies openness, accessibility, and vitality, and it has persisted up to this moment. The *IMS Bulletin* covered the 7th R Conference in 2014, which drew over 1,800 attendees from 200 schools and research institutions, as well as 600 companies. Each session was filled to capacity, with notable attendees including Hadley Wickham, who received the COPSS Award five years later (see Figure 7).

2.6 Retirement

COS: *In which year did you officially step down from your duties?*

Dr. Wu: I retired in 2010, but during that transition period, I still had one semester left of teaching at Berkeley. I then taught there for an additional six months before returning to China to officially conclude my retirement procedures.

COS: *After retirement, it appears that you have continued to impart knowledge in various locations. Have you also ventured into remote regions with scant educational resources?*

Dr. Wu: Absolutely, I have been teaching extensively. I have encountered a diverse range of students. Some, like Xuening Zhu and her peers from Sun Yat-sen University, are exceptionally talented. More recently, I have had the pleasure of teaching many promising students at Northeast Normal University. Conversely, there are those with a somewhat weaker academic foundation, such as students from Tibet University (see Figure 8) and Dali University.

COS: *How did you come to be teaching at these universities?*

Dr. Wu: Typically, they get in touch with me. Whenever there's an opportunity to teach, I'm open to any institution. For undergraduate courses, I typically need to coordinate with the academic affairs office a semester in advance. In contrast, graduate teaching provides more flexibility. I'm quite willing to teach outside of Beijing, since commuting from home would otherwise be quite inconvenient. When I teach in other cities, I stay either on campus or nearby, affording me the opportunity to immerse myself fully in the local culture. Regardless of whether

Figure 8: Dr. Wu with students at Tibet University, 2006.

it's scorching hot or freezing cold, after spending some time there, you start to appreciate the place and understand that each location has its unique scenery and people with distinct characteristics. For instance, I've visited Baotou several times, where it gets as cold as minus 19 degrees Celsius every night, but I've adapted to it, taking the shuttle bus with the locals and so on.

Remark: For a complete list of the universities where Dr. Wu has taught, please refer to Appendix A.

COS: *Over the years, you have remained consistently dedicated to writing and have authored numerous textbooks. Has "From Data to Conclusion" (Wu, 2005) now reached its fifth edition?*

Dr. Wu: Indeed, I have been quite productive in this regard. Additionally, I am continually learning, organizing, and synthesizing information, with the aim of employing straightforward language and tangible examples to encourage readers to reflect on the essence of data.

Remark: For a comprehensive list of textbooks authored by Dr. Wu, please refer to Appendix B.

3 Perspectives

3.1 Statistical Education

COS: *Drawing from your extensive teaching experience, what message would you most like to convey to your students? And what should statistics educators prioritize in their teaching?*

Dr. Wu: Effective learning should be goal-oriented. Engaging blindly in "foundation-laying" learning is far less efficient than learning based on the needs from practical applications. This approach is often referred to as the "pull-type learning method." The "spoon-feeding" method, in which teachers simply say "I will tell you," is the most detrimental to fostering creativity. This form of teaching reduces learning to results, rigid formulas, and overly simplistic binary concepts.

COS: *What is your vision for an ideal teaching method and classroom environment?*

Dr. Wu: My ideal classroom brims with energy and curiosity, fostering an environment where students feel empowered to challenge established conclusions and thinking patterns, even questioning textbooks and course materials. The liveliness and apparent "chaos" are signs of successful teaching, showing that students are engaged and curious.

COS: *In what ways do you believe we can establish a framework for assessing teaching effectiveness?*
Dr. Wu: Assessments or exams should absolutely eschew standardized answers. They should favor open-book formats and, ideally, be replaced by projects such as research, experiments, or data analysis reports. The rigid concept of "separation of teaching and assessment" stifles creativity and diversity, showing a lack of respect for both educators and learners. Each instructor should have the autonomy to emphasize the course content they find crucial. With science and knowledge advancing at a rapid pace, inflexible adherence to prescribed curricula poses a significant hurdle to disciplinary progress. Individualized instruction is a cornerstone of effective education. Standardized evaluation criteria that rely on "standard answers" compromise students' strengths and prematurely push them to focus on their weakness.

3.2 Statistics and Data Science

COS: *How do you comprehend the concepts of problem-driven and model-driven modeling?*
Dr. Wu: Utilizing John Tukey's wisdom to elucidate these concepts, he once stated, "Far better an approximate answer to the right question, which is often vague, than an exact answer to the wrong question, which can always be made precise" (Tukey, 1962). For example, employing a linear regression model to fit data with unknown characteristics is like producing a precise answer to an irrelevant question, as the subjective presumptions of linearity and residual additivity inherently constitute the wrong inquiry. Despite the fact that one can attain precise coefficient estimates, precise p-values (whose significance under dubious assumptions is also misleading), and so on (accurate to any decimal place), these findings are grounded in a flawed foundation. In stark contrast, any prediction generated through machine learning methodologies is an approximate solution that nonetheless addresses the real question at hand.
COS: *Even when dealing with experiments of the same type and purpose, a multitude of statistical and testing methodologies may be employed. Nevertheless, in practical scenarios, our choice of method is often influenced by the approaches used in similar studies, leading to a tendency to adhere to the methods outlined therein. Given this context, do we possess any definitive criteria for selecting the most appropriate statistical method in real-world applications?*
Dr. Wu: I firmly believe that prediction accuracy ought to serve as the primary criterion. Cross-validation, for instance, can be an effective tool for model selection. When a model falls short in prediction accuracy, delving into its interpretability or other facets becomes largely futile. It is imperative to reduce our over-reliance on statistical significance. The biases rooted in presumed model parameters lack substantive meaning. Instead, approaches grounded in reality and centered on data carry genuine value. The articles published in journals across different data science communities hardly overlap. Moreover, groundbreaking innovations are frequently overlooked by prestigious journals. Editors-in-chief often favor articles that adhere to their preferred frameworks, thereby stifling innovative tendencies. Take Random Forest (Breiman, 2001) and bootstrap (Efron, 1979) as examples; they were initially rejected by some journals but later gained wide recognition. The formulaic conclusions churned out by academically inclined statisticians who rely solely on model-driven methods, disconnected from practical contexts or based on unrealistic assumptions, often serve merely as stepping stones for career advancement within narrow academic circles, with little practical significance beyond that.
COS: *What role do you perceive the discipline of statistics to play in the development of contemporary society? Furthermore, how do you distinguish between statistics and data science?*
Dr. Wu: Regarding Hegel's statement, someone translated it as "What is rational is real, and

what is real is rational." This can be understood as meaning that everything that exists has a rationale for its existence and, conversely, every rationale finds its expression in existence. Given the absence of unified moral standards in human society, there is little merit in debating the issues of right and wrong. However, the question of which disciplines contribute to social development and productivity growth is an objective reality. Of course, whether human society should pursue further development, whether environmental conservation holds significance, and whether such matters are worth discussing amidst the looming threat of Earth's eventual demise are philosophical inquiries of an entirely different order.

The term "statistics" is frequently invoked in diverse contexts, yet its lack of a precise definition allows anyone to claim the title of statistician, albeit with vastly differing connotations. For instance, Professor Xiru Chen defines mathematical statistics as "a branch of mathematics" in the first volume of the Chinese Encyclopedia, whereas the Encyclopedia Britannica describes statistics as "the science of collecting, analyzing, presenting, and interpreting data." Any debate on statistics when definitions diverge is akin to a conversation between individuals without a common language. Similarly, there is considerable disagreement on how to define data science, rendering many disputes between these two disciplines largely meaningless.

COS: *Deep learning and artificial intelligence currently stand at the pinnacle of popularity, drawing a myriad of statistics-related graduates towards major internet companies. Should budding students embark on these trending fields? How can they highlight their distinctive competencies? What are your expectations for the future progression of data science, potentially over the next 10 or even 20 years?*

Dr. Wu: Beneath the veneer of these trendy terms lies the fundamental principle of data-centric thinking and hands-on expertise. Possessing such skills, which are in short supply and out of reach for many, guarantees that one will not face difficulties in securing an appropriate role. When it comes to selecting a specific organization in this rapidly changing environment, providing definitive advice is difficult and cannot be grounded in scientific certainty. The true essence lies in constant self-improvement, maintaining a perpetual state of demand, and remaining unchallenged in any setting. It is crucial to avoid blindly following trends; personal effort and dedication are of utmost importance. As for the future trajectory of data science, it is intrinsically linked to advancements in computer technology and analytical techniques. This encompasses the evolution of algorithms, market requirements, and the availability of talent. Occasionally, the market's predictive powers are severely constrained. The emergence of a new technology can rapidly alter the landscape, not necessarily due to competitive forces among peers, but rather as a result of external factors beyond one's control that can dramatically shift demand.

4 Commentaries

We asked three of Dr. Wu's former students to provide their comments about Dr. Wu's impact on their careers. Their commentaries are quoted in *italic*s.

4.1 Chunming Zhang

Chunming Zhang, who earned her Ph.D. in Statistics from the University of North Carolina at Chapel Hill (UNC-Chapel Hill) in 2000, is currently a professor in the Department of Statistics at the University of Wisconsin-Madison (UW-Madison). Her personal webpage can be accessed at: https://pages.stat.wisc.edu/~cmzhang/.

Professor Xizhi Wu is a pivotal figure in the development of statistics in China, recognized widely for his invaluable contributions to elevating research standards and nurturing talented individuals within the field. As an undergraduate fortunate to be under the mentorship of Professor Wu at Nankai University, I have been deeply honored to receive his invaluable guidance and unwavering support throughout my academic pursuits and research endeavors. It brings me immense pride and joy to share some cherished memories.

During my time as a student at Nankai University, I enrolled in Professor Wu's course on Nonparametric Statistics during the first semester of my senior year. At that time, the majority of students were unfamiliar with this course or unaware of its existence, and there were concerns that a professor returning from the United States might teach at a level beyond our grasp. However, Professor Wu's distinctive teaching style quickly alleviated our apprehensions. For instance, the term "robust statistics" was unknown to us before the course. When we first encountered it, "robust" seemed intricate and mysterious, with no supplementary reading materials available. Yet, Professor Wu explained it intuitively and amusingly using the Chinese word "pi shi" (resilient), which has remained etched in my memory. Years later, as I delved into statistical literature and encountered "robustness," I realized it was the Chinese translation of "robust." I believe other students were also deeply impressed by Professor Wu's clear teaching methods and humorous demeanor.

As an overseas returnee, Professor Wu was approachable and humble. My classmates and I often posed questions about the course during his office hours, and Professor Wu always addressed them with patience and meticulousness. In our final semester, a graduation requirement was an internship and thesis. I was fortunate to study under Professor Wu, who offered me a research opportunity. Our group, with three to four students, focused on reading research articles and discussing them with Professor Wu. Despite my limited knowledge, I thoroughly read the articles, visited the university library to find relevant literature, pondered deeply, and even derived some formulas based on my own thoughts. I presented the results in a draft to Professor Wu, who praised and encouraged me. These positive feedbacks significantly bolstered my confidence. I proudly achieved an excellent grade in the six-credit graduation thesis. I suppose this thesis was the starting point of my scientific research. I sincerely thank him for his guidance and nurturing.

In September 1990, I embarked on my journey to pursue a master's degree at the Chinese Academy of Sciences. The first year was dedicated to taking courses at the Graduate School on Yuquan Road, where one of the statistics theory courses, "Parameter Estimation," utilized Professor Xiru Chen's "Introduction to Mathematical Statistics" as a reference book. Since I couldn't borrow this book in Beijing, I wrote to Professor Wu, and soon received the original copy from him. Professor Wu's timely assistance expedited my systematic learning and mastery of fundamental theories and research methods, enabling me to excel in that challenging theory course. After completing my master's degree in 1993, I stayed on as an assistant researcher at the institute. During this period, I applied for overseas study and was fortunate to receive a recommendation letter from Professor Wu. Among offers from UNC-Chapel Hill and other prestigious universities, I ultimately chose UNC-Chapel Hill, becoming an alumnus linked to Professor Wu.

In August 1995, I joined the Department of Statistics at UNC-Chapel Hill to pursue my Ph.D. At that time, Professor Wu was a visiting professor in the department. The statistics department admitted one to two Chinese students annually, but whenever we met, we would hear Professor Wu share his profound insights on research, emphasizing the importance of perseverance, cultivating a scientific mindset, and maintaining a rigorous research attitude.

Upon completing my Ph.D. in 2000, I joined the University of Wisconsin-Madison as an

Assistant Professor. During my tenure at Madison, I served on the graduate admissions committee of the Department of Statistics several times and reviewed recommendation letters written by Professor Wu for applicants from the School of Statistics at Renmin University of China. The outstanding students whom Professor Wu strongly recommended received full scholarships from our department and continued to excel as Ph.D. graduates at UW-Madison.

Professor Wu is always calm, kind-hearted, and filled with humor. Our relaxed conversations with him have enriched us with both knowledge and valuable life lessons. I sincerely wish Professor Wu happiness, good health, and the fulfillment of all his heart's desires in life!

4.2 Sizhe Liu

Sizhe Liu, who studied at the School of Statistics, Renmin University of China between 2001 and 2005, has remained an active figure in the realm of data science ever since. He stands as one of the pioneers in promoting the R language in China, a former honoree of JD.com's Technology Hall of Fame, formerly Chief Data Scientist at 51Talk, and presently, the General Manager of Tastien's Big Data Center. His webpage link is: http://bjt.name.

My bond with Professor Wu as a mentor-mentee began in 2003, during the SARS epidemic– a year indelibly etched in the hearts of every Chinese person and a pivotal juncture in my life's journey. That year, Professor Wu introduced the groundbreaking "Statistical Computing" course at the School of Statistics, and for the first time, adopted the R language as the tool for statistical computation in domestic universities, guiding us into a novel intellectual horizon. Our semester-long engagement allowed me, a diligent student from a small town, to catch a glimpse of Professor Wu's profound academic achievements and extraordinary worldview. It was like gazing up at lofty mountains in awe while striving to follow a virtuous path with steadfastness.

Professor Wu's course served as a refreshing change for us: it did not rely on conventional Chinese textbooks and instead embraced English books and materials. Statistical outcomes were derived through R language commands, devoid of any intuitive, clickable interfaces. Assignments and presentation slides were meticulously designed using LaTeX, a task that, despite its complexities and initial daunting nature, ultimately yielded beautifully polished PDF documents. This distinctive methodology sparked my deep fascination with statistical computing.

After the inaugural class, I eagerly approached Professor Wu to inquire about supplementary books on the R language. Professor Wu replied with a humorous flair, "No Chinese textbooks are available. You can read the manual; it's very straightforward." His comment made me realize the challenge ahead and inspired me to come up with a holiday plan: to manually translate the R manual, "An Introduction to R." Two classmates, Jian Li and Wei Zhang, shared the same idea, and over the next two years, we three completed this task. During this time, we had heated debates about the translation of terms, especially the term "data frame." Wei and I engaged in a prolonged dormitory discussion about it. Initially, we translated it as "shujuzhen," but ultimately opted for "shujukuang," believing that the latter better encapsulated the density and information content of the data, while the former seemed insufficient and somewhat whimsical.

This experience taught me a valuable lesson, undergraduates can acquire fresh knowledge through original textbooks. In the "Regression Analysis" course we recently took, we were taught how to calculate β either manually on scratch paper or through menu operations in SPSS. However, we discovered that results could also be obtained through function commands. Our hand-

written assignments seemed crude in comparison, and we uncovered the elegance of LaTeX for typesetting. Reflecting on it now, although the learning journey was fulfilling, it was akin to skipping the "easy," "normal," and "hard" modes in a game and diving straight into the challenging "hell" mode. This rigorous training has profoundly shaped my career. When confronted with seemingly intractable problems, I can now approach them with composure, invest the necessary effort, and ultimately overcome them.

Professor Wu is not just an academic leader but also a fervent advocate of the "lifelong learning" philosophy. When explaining the relationship between mathematics and statistics, he stressed that statistics are used to solve problems and that enhancing one's math skills when facing challenges is always timely. He acquired much of his statistical knowledge through self-study, without the benefit of specialized instruction. At the age of 72, Professor Wu mastered the Python language in just two weeks, using this accomplishment to inspire us: "If I, at my age, can learn it, what excuse can you young individuals possibly have for not learning?" Another invaluable life philosophy that Professor Wu imparted to us is the importance of not blindly following authority. In class, he stressed that we should not blindly believe him or anyone else and that everything should be viewed dialectically. Honestly, I did not fully grasp the depth of his words then. After entering the workplace, the principle of "boldly hypothesize, carefully verify" became my guiding principle, and critical thinking became an integral part of my intellectual and spiritual development. Some say that statistics belong to the realm of philosophy, and I am grateful to Professor Wu for unconsciously and consciously imparting such immense wisdom while enlightening us in statistical thinking!

The spirit of freedom, sharing, and openness embodied by R has continued to influence me. I authored "Learn R in 153 Minutes,"' translated works like "R Reference Card" and "R in a Nutshell," and thus helped many enthusiasts interested in statistics. Some even chose statistics as their lifelong career, inspired by my writings. The ideological spark advocated by Professor Wu has been transmitted from one generation to the next among nascent scholars.

I frequently share with my children tales of Professor Wu and the profound influence he has had on my life, in the hope that they will adopt an unyielding sense of curiosity, relentlessly pursue knowledge, dare to question authority, and strive to make positive contributions to society. This statistical treasure deserves to be cherished and passed down.

4.3 Yixuan Qiu

Yixuan Qiu is an Associate Professor in the School of Statistics and Data Science at Shanghai University of Finance and Economics. Prior to this, he served as a postdoctoral researcher at Carnegie Mellon University. He completed his undergraduate studies at Renmin University of China and obtained his PhD in Statistics from Purdue University. For a substantial period, he has been an editor and administrator of the renowned statistics community COS, has contributed to the creation of numerous popular open-source software packages, and has also translated a series of books focusing on statistical modeling, R programming, and data visualization. His webpage is: https://statr.me.

My initial encounter with Professor Wu occurred in the "Application of Statistical Analysis Software" course during my junior year of undergraduate studies in 2008. As the instructor, Professor Wu expertly guided us through the intricacies of utilizing the R language for data analysis and modeling, with a particular emphasis on the application of cutting-edge machine learning techniques. At that time, concepts like "big data" and "data science" were nascent and scattered across a few publications, while artificial intelligence was still primarily confined to

the realm of science fiction. The R language and machine learning were relatively unknown territories in most statistics departments in China. Against this backdrop, Professor Wu, with his remarkably visionary outlook, introduced this groundbreaking course to the School of Statistics at Renmin University of China—a pivotal moment that marked a significant turning point in academic history.

Even in 2024, when artificial intelligence has become ingrained in numerous disciplines, machine learning is still not a mandatory component of all statistics curricula. Reflecting on the past 16 years, it is astonishing to realize that Professor Wu was already actively advocating for programming proficiency among statistics students and championing modern machine learning models. I often count myself incredibly fortunate to have been exposed to these unconventional data analysis methods under Professor Wu's mentorship. It was during this time that my deep-seated interest in statistical computing and machine learning was ignited—an interest that has persisted to this day. The validation of Professor Wu's prescient vision has been evident in the past decade and beyond, as statistics has continually expanded its horizons and emerged as a cornerstone of data science, influenced by these novel ideas and methodologies.

Another admirable trait of Professor Wu is his relentless pursuit of innovation and exploration. In an era where statistical analyses predominantly relied on commercial software, Professor Wu taught the R language and cultivated a generation of pioneers in open-source data analysis software. Today, as artificial intelligence has seamlessly integrated into the scientific landscape, Professor Wu has embarked on learning Python programming and deep learning from scratch, authoring numerous related textbooks from a statistical perspective. In one speech, Professor Wu revealed that he began learning Python at 72 years old and achieved proficiency within just two weeks, inspiring young minds to embrace knowledge without fear of the unknown. Whenever my students express hesitation towards programming or new fields in my own teaching practice, I often invoke Professor Wu's example to ignite their passion for continuous learning and innovation, as well as to motivate myself.

I hope these anecdotes will serve as a beacon of inspiration for more statisticians to embrace and disseminate Professor Wu's educational philosophy and scientific spirit.

5 Conclusion

The intellectual and pedagogical impact of Professor Xizhi Wu has been profound. His pioneering role in introducing modern statistical computation, particularly open-source tools such as R, established practices that are now foundational to statistics and data science education in China. By emphasizing statistical thinking over rote application of formulas, he set a model of pedagogy that remains highly influential. Even in retirement, he continues to teach advanced courses and share his expertise with universities across the country, extending opportunities to regions where such resources are often scarce.

Equally significant is the enduring influence of his mentorship and community-building. Through strengthening academic programs, supporting professional communities, and cultivating talent, he has helped shape generations of statisticians. His textbooks and monographs, widely adopted and repeatedly reprinted, continue to serve as lasting resources. Many of his mentees now hold leadership roles in academia and industry, both in China and abroad, carrying forward his vision. Looking ahead, his career demonstrates the vital role of educators who expand access, inspire curiosity, and prepare the next generation for the rapidly evolving landscape of data science.

A Universities Where Prof. Wu Has Taught

In this section, we list all the universities where Prof. Wu has taught in chronological order.

1. Nankai University (1976–1999)
2. University of California, Davis (Fall 1987–Spring 1989, 5 quarters in total)
3. University of North Carolina at Chapel Hill (Fall 1995, Spring 1996)
4. Renmin University of China (1999–2011)
5. Peking University (School of Mathematics, Fall 2000; Guanghua School of Management, Spring 2000, 2002, 2003, 2004)
6. University of North Carolina at Charlotte (Fall 2001, Spring 2002)
7. Tibet University (Spring 2006)
8. Sichuan University (Spring 2007)
9. Capital University of Economics and Business (Spring & Fall 2007, 2010)
10. Southwestern University of Finance and Economics (Spring 2007, Spring 2010, Summer 2014, Spring 2021, Spring 2023)
11. Central University of Finance and Economics (Fall 2007, 2010)
12. Harbin University of Science and Technology (2008, Fall 2018)
13. Xinjiang University of Finance and Economics (Spring 2009)
14. University of California, Berkeley (Fall 2009, Spring 2010)
15. Yunnan University of Finance and Economics (Spring 2011, 2013, Spring 2014, Spring 2015, Fall 2017, Fall 2018, Fall 2021, Spring 2024)
16. Sun Yat-sen University (Spring 2012, Fall 2014, Fall 2017)
17. Inner Mongolia University of Science and Technology (Fall 2012, Fall 2013)
18. Guangxi University of Finance and Economics (Spring 2013)
19. Southwest Jiaotong University (Fall 2013)
20. University of Chinese Academy of Sciences (Sino-Danish College) (Spring 2014)
21. Yunnan Normal University (Spring 2014, Spring 2015, Fall 2019, Fall 2022)
22. Dali University (Spring & Fall 2015)
23. University of Michigan, Ann Arbor (Spring 2017)
24. Northeast Normal University (Spring 2018, Fall 2019, Fall 2020, Fall 2021, Fall 2022, Fall 2023, Fall 2024)
25. Chengdu University of Information Technology (Fall 2018, Spring 2023)
26. Guizhou Normal University (Fall 2019)
27. Chongqing Normal University (Spring 2023)
28. Chongqing University of Arts and Sciences (Fall 2023)
29. Kunming University (Spring 2024, Fall 2024)
30. Hengyang Normal University (Spring 2024, Fall 2024)

B Books That Prof. Wu Authored

In the reference, we list all the books that Prof. Wu authored in chronological order. The first one is in English and the others are in Chinese.

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