

The View from Lewis College

BIG PICTURE

Fall 2015

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Lewis College
of Human Sciences



ILLINOIS INSTITUTE OF TECHNOLOGY

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*Informing the future: New worlds
of possibility at the intersection of
humanity and technology*

Lewis College of Human Sciences was formed on
June 1, 2013, and houses the Departments of
Humanities, Psychology, and Social Sciences.

Illinois Institute of Technology, also known as
Illinois Tech, is a private, technology-focused
research university offering undergraduate
and graduate degrees in engineering, science,
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Robert Schleser was an integral part of the Illinois Tech faculty for more than 30 years. We pay tribute to a dear friend and colleague.

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Find bonus features for *Big Picture* at humansciences.iit.edu/bigpicture.



Margaret Shurrager Seres (R) accepts the Illinois Tech Hall of Fame award on behalf of David Boder from Dean Himes (L).

DEAN'S GREETING

It has been an exciting year at Illinois Tech and Lewis College. In July, we welcomed a new provost, Frances Bronet, to campus and on September 18, 2015 we inaugurated a new president, Alan Cramb.

Strong leadership is important in any organization, and Illinois Tech is no exception. Good leaders are confident, ethical, and creative, and have strong communication skills. They are able to build on the strengths of a group and make decisions. They see the big picture and realize how their actions fit into the mission of the organization.

Lewis College plays a unique role in shaping leaders at Illinois Tech. All students take courses in the college and learn to reflect upon their roles in society through classes in communication, inequality, behavior, history, and philosophy. Nearly every day I read another article about the characteristics employers look for in new hires—good communication skills, the ability to work in teams, decision-making skills, and an understanding of a diverse workforce. Lewis College provides Illinois Tech students with experiences that will serve them well in the future.

Our students actively put these skills to practice. They are elected to student government, organize entrepreneurship activities, serve as residence hall advisors, and lead athletic teams. These leadership opportunities position graduates for successful careers in an ever-changing world.

To highlight our focus on leadership, we formed the Center for Leadership Studies, which includes the successful M.A. and Lila Self Leadership Academy. The Leadership Academy offers student workshops throughout the year, and all second-year students are invited to attend a retreat to develop leadership skills, teamwork, and a sense of community. We hope to create similar workshops for alumni, community members, and corporations in the future. The center will also house an academic minor focused on the study of leadership.

This fall David Boder was inducted into the Illinois Tech Hall of Fame. Boder was a professor and chair in the Department of Psychology from 1927–1952. Using a wire recorder invented at Illinois Tech, Boder demonstrated incredible leadership and public responsibility in recording and publicizing the oral histories of survivors of Nazi death camps. Long before we had a college focused on the critical intersection of technology and humanities, he preserved the original testimony of survivors—stories that one can listen to exactly as they were recorded nearly 70 years later. I was honored to host Margaret Shurrager Seres (M.S. SED '64, M.S. REHC '69), who accepted the award on Boder's behalf at the ceremony in September.

As I travel around the country, I meet alumni who lead corporations, government agencies, and volunteer organizations. I am proud to see their accomplishments and recognize the role that their Illinois Tech experience played in their success.

I hope you enjoy reading the stories of some of our Lewis College family members who are leaders in the communities in which they teach, learn, and serve.

Christine L. Himes
Dean, Lewis College of Human Sciences



Lewis College students visit Belfast, Northern Ireland, as part of their summer study abroad program in Scotland.

ALGORITHMS

Human Influence on the World of Data



How do algorithms shape the information we see? What is the impact of human influence on algorithms? The inaugural Lewis College Roundtable explored these questions and more on October 29, 2015. The 90-minute event featured a thought-provoking discussion among a diverse group of panelists—Angela M. Cirucci, Jason Resch (CS '06), Christian Sandvig, Nick Seaver—who each brought a different area of expertise to the table.

"It's amazing that computing has evolved so much that we are even having this conversation," said Sandvig, an associate professor of communication studies and information at the University of Michigan, before the event. "I am interested in examining how computers can be accountable for decision-making. What qualities of computers are making decisions for humans? How are algorithms sorting through cultural data and feeding us information?"

Cirucci added, "Algorithms have become a buzzword recently. I'm interested in understanding how people define them and how they talk about them." As an assistant professor of communication studies at Kutztown University, she studies the philosophy of social networks and examines how the architectures of those networks shape our identities and personal narratives.



2015 roundtable participants (L-R): Nick Seaver, Angela Cirucci, Chris Himes, Jason Resch, and Christian Sandvig

The roundtable conversation, moderated by Christine Himes, dean of Lewis College, opened with a discussion about Facebook, a common example of the use of algorithms. Many people recognize that Facebook filters the information we see, but many are not aware of why or how that happens.

"On Facebook, when you click the like button on a post with a link, you are forever associated with the beginning part of that URL. This data is recorded and used to determine what ads and suggested likes show up on your screen," Sandvig explained.

"Algorithms change rapidly, and that change is often algorithmic," Seaver said. "When thinking about Facebook and algorithms, it is actually this enormous, complex thing. At any one time, each of us experiences a slightly different Facebook. Algorithms are used to create different test groups and interfaces, which help Facebook determine what keeps users on the site the longest."

Seaver, an anthropologist who will join Tufts University as an assistant professor in January 2016, is interested in how algorithms function in human domains, such as music recommendation systems like Pandora. "There is a mismatch between how humans approach the world and how algorithms approach the world. We must recognize the human role in the creation and use of algorithms," he said.

Resch, a software architect at Cleversafe, creates algorithms that sort data. He also develops them to add security features to database systems. His work has resulted in more than 130 patents issued and 310 patents pending. "Algorithms have limitations. They are not creative or moral, like humans, and they never second guess decisions; they just follow a series of commands," he responded. "Algorithms can make mistakes, unforeseen by their creators, hundreds or thousands of times in a second without time for human interventions."

"Whatever is created by humans has human value in it. If there are 150 people working on one algorithm, then the values of those 150 people are embedded into the system. Every human system is non-neutral," added Cirucci.

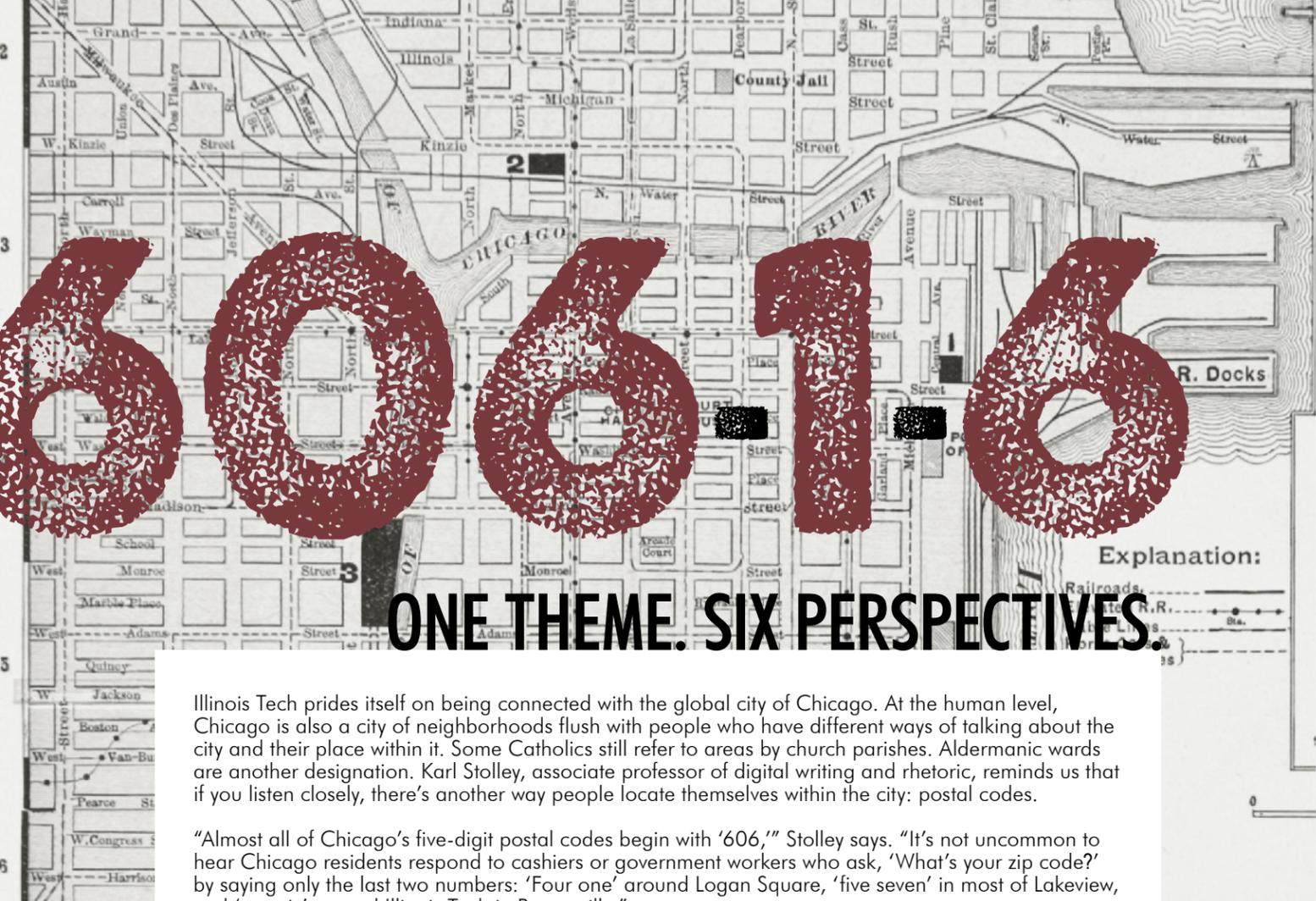
Libby Hemphill, assistant professor of communication at Lewis College, attended the roundtable and

commented that more transparency is necessary in the digital space. "We don't need to understand what the algorithm is doing, but why it is doing it. There needs to be more transparency in what goes into making an algorithm—what values were put into it and why?"

The event concluded with the final question: Can algorithms replace the human judgment process?

"Yes, if we consider that the brain is a machine, then we can eventually get there," Resch responded. "We've seen a lot of examples in the news recently, such as driverless cars. As machines begin to eclipse human decision making, it will be interesting to see how computers take over."

As technology continues to evolve, it is clear that algorithms are here to stay and will continue to play significant roles in our lives.



ONE THEME. SIX PERSPECTIVES.

Illinois Tech prides itself on being connected with the global city of Chicago. At the human level, Chicago is also a city of neighborhoods flush with people who have different ways of talking about the city and their place within it. Some Catholics still refer to areas by church parishes. Aldermanic wards are another designation. Karl Stolley, associate professor of digital writing and rhetoric, reminds us that if you listen closely, there's another way people locate themselves within the city: postal codes.

"Almost all of Chicago's five-digit postal codes begin with '606,'" Stolley says. "It's not uncommon to hear Chicago residents respond to cashiers or government workers who ask, 'What's your zip code?' by saying only the last two numbers: 'Four one' around Logan Square, 'five seven' in most of Lakeview, and 'one six' around Illinois Tech in Bronzeville."

Building from Stolley's observation, each issue of *Big Picture* will center on one unifying theme and present six distinct perspectives from our community—606-1-6. The 1-6 theme highlights the common scholarly spaces we inhabit and the different perspectives with which we view the world.

Our theme this issue is algorithms.

Algorithms have become embedded into the fabric of our everyday lives in ways big and small, menacing and mundane, and sometimes downright absurd. A prominent example is the vast amount of user data collected by advertising giants online. Or how Facebook will accidentally remind you of a loved one's passing in its celebratory year-in-review feature. Despite the negatives, great things have come from algorithms as well. They have been used in flight aviation to drastically reduce human-error crashes, and have dramatically improved medical diagnostics in recent decades.

Whether forecasting economic conditions or suggesting Netflix picks, algorithms are here to stay. In this section we explore how algorithms and big data are being used in the work and research of just a few of our Lewis College community members.

COMPLEXITY OF ALGORITHMS.

I am currently teaching two courses at Illinois Tech and in both we dedicate a week to discussing algorithms. As a concept, however, the algorithm is now so pervasive that it trickles down into most discussions about technology, be it for the inadvertent cruelty it can sometimes afford, as in the context of my *Digital Death: Archives, Memories, Bodies, and Decay* course, or in its potential to inform the limits of agency through infrastructure and policy, as we discuss in my course, *Current Issues in Media and Communications Studies: Drones, Driverless Cars, and Data Janitors*.



Mél Hogan

For a while now, I've been collecting stories about algorithms at designeralgorithms.melhogan.com with the intent of tracking the discussion (often manifested in the form of hype or anxiety) that surrounds the algorithm. Mark Andrejevic of the University of Queensland proposed that in a society increasingly driven by a "drone logic"—that is a world ubiquitously mediated and monitored by sensors and aggregative data—the algorithm reinforces the long-feared global panopticonic surveillance apparatus, where human lives become regulated by a big data ideology that in turn supports the destructive inequalities of capitalism, consumption, and war.

However, to entrust the algorithm with an independent inherent power is problematic, as noted by various media scholars. Of note, the work by Western University Canada's Sarah T. Roberts on commercial content moderation speaks of human algorithms masquerading as "artificial" intelligence. Roberts highlights the laborers, the many thousands of global workers, located at social media company headquarters, in call centers, and in "the cloud," are charged with the "filtering" of the Internet. Her work effectively disproves the idea that machines "do everything," and highlights instead the inextricable connection of human to machine.

The research of UCLA's Safiya Noble on search engines demonstrates that algorithms are deeply political, and as commonly used, work at the service of companies with decidedly corporate interests. Rena Bivens of Carleton University makes the same argument in her work on software by questioning who gets to program and how those ideals reflect gendered visions. My own work on data centers looks at Internet infrastructures, including the material counterpart to the flows of algorithms and big data, and their environmental impacts.

Together, these interventions reveal a disjointed complexity about the algorithm, but one that challenges the emergent idea that quantifications and calculations offer a deeper truth about humanity.

Mél Hogan
Assistant Professor of Communication

ALGORITHMS IN SOCIAL SCIENCE.

Many of the problems that social scientists attempt to solve are so complex that the causal relationships become difficult to verify. I have often wondered why we have this problem relative to the natural scientists, where there is an apparent ease in modeling how things operate. Case in point, Robert Kalaba, my *Mathematic Methods in Dynamic Economics* professor at USC, once described to me his model of the human kidney. I envied the certainty that exists in the natural sciences. Through the use of social science research methods and statistical tools, I have since discovered that there is no monopoly on certainty.

I do not craft the algorithms upon which these statistical tools are based, but I do rely on them extensively to address the endogeneity problem, which is probably the most challenging problem for me when engaging in statistical analysis. The endogeneity problem addresses the seemingly constant potential for there to be reverse causality or feedback loops in the model, disqualifying our dependent variables. In my area of research, which is focused on research and development impacts on economic growth, scholars have addressed this by expanding traditional economic growth theories to include education effects. Others conduct robustness checks based on the inclusion of lagged dependent variables as predictors. Endogeneity can also be eliminated by employing a two-stage instrumental variable approach or through even more advanced simultaneous equation models.

This list of techniques represents but a handful of those available. They are truly incredible, allowing many of us to engage in statistical analysis, which would have otherwise been prohibitively costly. Ask a senior scholar who used econometrics in the 1960s and '70s what it was like to conduct a simple linear regression analysis, and he or she will likely tell you that it involved hours of handling punch cards and major funding requirements.



Matthew A. Shapiro

Today, in combination with achievements in computing, we capitalize on the convenience and reliability of software to free up our other resources and ultimately engage in increasingly shrewd analyses of social processes.

Matthew A. Shapiro
Associate Professor of Political Science

"Through the use of social sciences research methods and statistical tools, I have since discovered there is no monopoly on certainty."

BECOMING A DATA SCIENTIST.

Data scientist. A job title that barely existed four years ago is now coined as one of the most sought-after positions in many technology-based companies. The term data science is an umbrella for a multitude of analytics-focused jobs. Under this umbrella are several specialized areas, responsibilities, and tools that define a specific role within a company. Those who work with big data can specialize in areas such as bioinformatics, marketing analytics, and Web analytics. Within each of these areas, various responsibilities include statistical analysis, query and reporting, data warehousing, and data integration. Finally, within these responsibilities there are certain tools built for various tasks, such as software like Hadoop and Python for data manipulation, SAS and R for statistical analysis, SQL for querying, and Informatica for data integration.

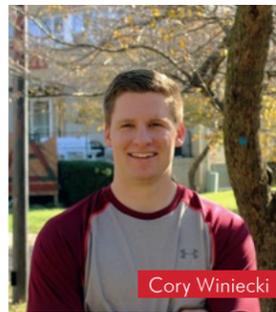
Fortunately, I was able to gain firsthand experience in the world of data science over the summer with an internship at AIM Consulting, an IT-based consulting firm, opening my eyes to technologies that are used in enterprise-level environments. Working for a consulting firm provided insight into the career options that are available to me when I graduate, whether that be in business intelligence or programming. Because of this new awareness, I have started to learn programming languages outside of the classroom that will help me start a career in an analytics-based position.

BIG DATA IN PSYCHOLOGICAL RESEARCH.

Psychologists have long been interested in understanding the factors that facilitate or inhibit learning. Traditionally, such research has relied on relatively simple measures that consider whether an individual has a higher score on a test of particular material after some intervention designed to enhance learning.

In a recently completed grant project, our research team adopted a more sophisticated approach to understanding student learning of biology. We examined a specific hypothesis that many college students may be hampered in learning biology by their inability to self-regulate. We relied on a computerized tutoring system that provided cognitive, affective, and metacognitive support to students in real-time. The research tested different versions of the MetaTutor program, a multi-agent, intelligent tutoring system, to examine how self-regulatory processes emerge and their subsequent impacts on student learning. From several studies collected at multiple North American universities, we collected and analyzed substantial amounts of data that included learning outcomes, self-report measures of emotions and agent perceptions, and multi-channel data (e.g., eye-tracking, log-files, agent-learner dialogues, facial expressions of emotions, metacognitive judgments, etc.).

Using the multi-channel data, the team mapped out specific cognitive, metacognitive, and affective processes related to self-regulated learning (SRL). For example, we discovered that the pedagogical agents' prompts for



My passion for data science does not exist around linear regression and iterative algorithms. It exists when statistical concepts are visualized through good design. Companies like Datascope aim to improve businesses by taking scientific principles and applying them to design tools and methods. Transforming pure facts and figures into something meaningful and eye-catching is what I wish to pursue after my degree. Numbers are more meaningful to individuals when they are able to touch, see, and manipulate what they are viewing, which is made possible by algorithms.

We have reached a point in big data beyond two-dimensional charts and graphs. The visualization of big data must become actionable—and essentially more human—to fit our ever-changing needs.

Cory Winiacki (3rd Year)
Applied Analytics

“Transforming pure facts and figures into something meaningful and eye-catching is what I wish to pursue after my degree.”

students to self-regulate their learning increased their use of these processes, and ultimately lead to higher learning outcomes. We also found that the way in which these prompts are enacted, both by learners and pedagogical agents, contributes to differing (e.g. positive or negative) affective states (e.g., frustration, confusion), which can, in turn, affect learning outcomes differently.



The sheer volume of data collected through our experimental paradigm presented us with both opportunities and challenges. To that end, we developed a series of scripts and programs to partially automatize the temporal alignment of the various data sources, and to facilitate researchers' integration of data across conditions and analyses of event-based data. These programs and tools include the MetaTutor Emotion Annotator, MetaTutor Log Analyzer, and Emotion Log Analyzer. Further, we developed coding schemes to increase our accuracy and precision in isolating, measuring, and analyzing the deployment of SRL processes during learning and experimented with various methods and analytical techniques to be used to examine the temporal sequencing and unfolding of SRL processes during learning with MetaTutor.

Ronald S. Landis
Nambury S. Raju Professor of Psychology and
Department Chair

OPTIMIZING BUSINESS FUNCTIONS.

“We have 37 people in redeterminations and have no idea how they're performing.” Thus, my boss set the stage for my next project.

I am a programmer/analyst at an insurance company. We did have an idea about the redetermination group's performance, but were not using an insightful metric. In the department, which was responsible for examining claims in the appeal process, each clerk was required to complete 45 pieces of correspondence per day and successfully did so. However, not every piece was the same; some pieces took one or two minutes to complete and others took 15 minutes. The workload was not consistent.

The program used by the clerks produced a report with the start and stop time for each item, the type of correspondence, and the destination of the piece, among other things. Fortunately, the department kept about two years' worth of this raw data, so I put it into a database. The difficult step was to make sense of roughly 330,000 pieces of data per year. While in most circles this does not count as really big data, it was far beyond what could be processed manually and big enough for patterns to emerge.

As I looked at the data and started writing preliminary analyses, two things emerged—how much time was actually spent working and how quickly clerks handled the mix of work. Usually, clerks finished one piece and started the next one within a minute, but sometimes there were gaps ranging from several minutes to a few hours in between pieces. Additionally, there was considerable variation in how long it took individual clerks to work the same type of item.



Using this data, I determined how many items the clerks could have been expected to turn out per day, based upon the mix of the correspondence types. This gave the managers a way to find the underperformers and determine who needed additional training.

In addition, a new feature in the system tracked the performance metrics for the clerks. This information was only visible to each individual clerk and the manager, and resulted in a big boost in productivity.

John Cole (PSYC '74, CS '75)

VISUALIZATIONS OF ALGORITHMS.

If a picture is worth a thousand words, then a social media user's digital footprint can paint an infinite number of pictures. Information visualization is a field that lies at the intersection of art, science, and technology and can be recognized in everything from subway maps to project management software to family trees.

My research centers on multidimensional information visualization techniques in order to gain an understanding of identity presentation in social media. Currently, I am studying the online identity of public figures, such as members of Congress, with common personas. Using their behavior on Twitter, as well as relevant data from external sources, I can create a visualization interface that provides a more robust picture of the individual.

I am also exploring visualization techniques that provide insight into the online identity of users taking part in social media events that are defined by the use of hashtags. Hashtags can be used to discuss a variety of events that take place in online and offline environments. These events include university commencements, music award shows, major sporting events, or political revolutions. My current work is focused on a few hashtags related to a Twitter-based event surrounding sexism in the video gaming industry.



Information visualization can provide users with visual feedback that would otherwise be too cumbersome to formulate by simply examining text-based data. A great deal of the data stored by social media companies is often personal data. We are now faced with data that is stored in petabytes, exabytes, and soon zettabytes. Furthermore, today's algorithms have the capability to use this data to very accurately predict highly personal information, such as one's age, race, religion, and sexual orientation, based on the types of accounts that a user might follow on social media.

Information visualization has immense possibilities for the future. It requires the ability to work with big data, the technical skills to extract that data through coding, and the creativity to design visualizations that are both comprehensible and aesthetically pleasing. The reality is that as time goes on, big data is only going to get bigger and what we once considered to be a massive amount of information will seem minuscule in hindsight. That is what makes this field so exciting.

Athir Mahmud, Ph.D. candidate
Department of Humanities

“If a picture is worth a thousand words, then a social media user's digital footprint can paint an infinite number of pictures.”

GROWING EXPERTISE

Faculty



Hao Huang joins Illinois Institute of Technology as an assistant professor of social sciences. Most recently, she was a postdoctoral research associate in the Department of Geography at the University of Utah specializing in economic geography and development, environmental geography and planning, and geographic information systems.

Her research concerns globalization, urbanization, and sustainability. Specifically, she focuses on dynamics of global economic activities, and their effects on cities, regions, and places with respect to foreign direct investment and trade, inequality and poverty, development and environment, and built environment and urban health.



Sam McAbee is now an assistant professor of psychology at Illinois Institute of Technology after spending one year here as a visiting scholar. His primary research interests are in the areas of psychometrics and individual differences, with an emphasis on the design and evaluation of psychological measures and their application to decisions in educational settings and the workplace. His research examines the role of personality traits in academic and workplace settings, particularly relating to issues surrounding college student employability and success.

Board of Advisors



Judy Erwin, managing director at ASGK Public Strategies in Chicago, has joined the Lewis College of Human Sciences Board of Advisors.

Erwin brings extensive experience in higher education, including five years (2005–10) as the executive director of the Illinois Board of Higher Education (IBHE). Prior to her tenure at IBHE, she was elected to five terms in the Illinois House of Representatives, representing Chicago's Lincoln Park, Near North, and Loop neighborhoods. While in office, she chaired the House Higher Education Committee and was the vice chair of the Higher Education Appropriations Committee. Prior to her time in office, Erwin worked as a communications senior officer at both Res Public Group and Kemper Lesnik for nearly 10 years.



Stephen C. Urrutia, managing director at JPMorgan Chase & Company, also joined the Lewis College of Human Sciences Board of Advisors.

Urrutia has more than 22 years of operations management experience in the financial industry. His background includes a variety of senior leadership roles in global trade finance operations, treasury operations, transaction processing, and consumer banking. In 2014, Urrutia was elected to Illinois Institute of Technology's Board of Trustees.

REMEMBERING DR. BOB



Robert Schleser
Professor of Psychology

This year, the Department of Psychology lost one of its best. On June 23, 2015, Professor Robert Schleser, passed away. Dr. Bob, as he was affectionately called by his students, was well respected not only as an incredible scholar, but also as a genuinely sincere colleague and indefatigable mentor.

"He was a maverick among academics, a source of not only knowledge but also great wisdom, philosophy, and irreverence," says former student Alison (Cromey) Crean-Davis, who graduated from Illinois Tech with a Ph.D. in Clinical Psychology in 1999. "He made his lab a home for his students."

A member of the faculty for more than 30 years, Schleser mentored more than 90 Ph.D. students, an astronomical achievement by any measure. According to fourth-year student Deysi Paniagua, he truly cared for his students and would go out of his way to nurture their development.

"One day Dr. Bob noticed I was stressing out and asked me to stay after class," Paniagua says. "I immediately began to cry and told him that I felt as though I did not belong in such a rigorous university. He cut me off, saying, 'Of course you are capable; we would have never invited you to come [to Illinois Tech] if we didn't think you were capable.' That happened three years ago, and I continue to think about it every day. Bob took me under his wing, nurtured my confidence, sustained my motivation, and showed me how to believe in myself."

Schleser's colleagues were equally impressed with his spirit and warmth.

"I came to always look forward to seeing him or talking to him; he kept things real," says Ron Landis, chair of the Department of Psychology. "He made work fun, and one thing that always came through was how much he loved the students. His presence alone, even when his illness was progressing, was encouraging."

Clayton Hinkle was a graduate student in Schleser's 277 Lab, which explored the research and clinical application of child psychology, for five years, from 2008–2013, and attributes his career success to his training alongside Schleser.

"While graduate school delivered on its fair share of obstacles and anxieties, he always went to bat for his students," Hinkle says. "As a fellow lab mate said after Bob's passing, he had a knack for calming the graduate student soul and putting life and everything we went through into perspective."

The trove of emails from Schleser that Hinkle recently unearthed illustrate that easy, supportive nature. "His responses were almost always one-liners," Hinkle says.

"Relax."

"Looks perfect. Stop working, crack a beverage, and call it a night."

"Never expected anything less. Go celebrate."

We celebrate a truly remarkable mentor and a great man who made a lasting impact on all those that had the pleasure of knowing him.



Lewis College Team Named Nayar Prize Finalist



Nayar Prize check presentation (L-R): Provost Frances Bronet, Carly Kocurek, Jennifer Miller, and Madhavan Nayar (M.S. IE '68)

Congratulations to co-principal investigators Carly Kocurek (humanities) and Jennifer Miller (psychology), and their collaborators Matthew Bauer (linguistics) and Cynthia Hood (computer science), on their selection as one of three finalist teams for a Nayar Prize for their project, "Game Development for Early Language Acquisition in High-Risk Children."

Children from low-income communities are more likely to have significantly lower levels of language skills than children from higher-income communities. Issues with crucial aspects of language development, including processing and vocabulary size, can begin as early as 18 months of age, so there is a great need for early intervention tools. The team will create a highly interactive mobile game for children aged 24–36 months that will aim to increase vocabulary growth and parent-child interactions.

Established in 2015, the Nayar Prize was created for Illinois Tech's faculty, staff, and students to develop innovative, multidisciplinary research projects that will, within three years, produce meaningful results with a societal impact.