

Spatial Structures in the Social Sciences 2015 Summer GIS Institute

Final Presentation Program

May 29, 2015 Population Studies and Training Center
Seminar Room

9:30 – 9:45 am	Welcome
9:45 – 10:45 am	Session I: Spatial Inequality
10:45 am – 12:00 pm	Session II: Using GIS and Spatial Analysis for Historical Applications
12:00 – 1:00 pm	Lunch
1:00 – 2:00 pm	Session III: GIS Applications in the Social Sciences and Humanities
2:00 – 3:00 pm	Session IV: Health and GIS
3:00 – 3:15 pm	Certificate Presentation
3:15 pm	Close of Conference

PARTICIPANTS

Amanda Boston (Africana Studies)

Benjamin Bradlow (Sociology)

Elizabeth Cecil (Religious Studies)

Stephanie Chow (Center For Gerontology and Healthcare Research)

Karlene Cunningham (Psychiatry and Human Behavior)

Lia Dykstra (History of Art and Architecture)

Malay Firoz (Anthropology)

Scott Frickel (Sociology)

Sarah Gaskell (Public Health)

David Hochfelder (History, University at Albany)

Jessica Katzenstein (Anthropology)

Eleanor Martin (Moses Brown School)

Abhilash Medhi (History)

Krystal Sarcone (Public Health)

Yang (Cindy) Shen (Economics)

Yibing Shen (Sociology)

Amanda Zagame (Sociology)

PROGRAM

SESSION I: SPATIAL INEQUALITY

Benjamin Bradlow, *Have You Heard From Johannesburg: Inequality in the “City of Gold”*

Amanda T. Boston, *Mapping Race and Space in Gentrifying Brooklyn*

Amanda Zagame, *Is Re-Segregation on the Rise in Boston?*

Jessica Katzenstein, *It’s a Fine, Fine Line: Mapping Military Equipment Transfers to U.S. Law Enforcement through the 1033 Program*

SESSION II: USING GIS AND SPATIAL ANALYSIS FOR HISTORICAL APPLICATIONS

David Hochfelder, *The Challenges of Digitally Reconstructing a Demolished Streetscape—The “98 Acres in Albany” Project*

Abhilash Medhi, *The Anatomy of Raiding in Colonial Northeast India*

Elizabeth A. Cecil, *Śiva and Salt: Religious Life around the Salt Lakes of Northern Rajasthan (7th–10th century CE)*

Lia Dykstra, *The Museum and the Medieval Building: Mapping Trends of Adaptive Reuse in France*

Eleanor Martin, *The Eruption of Mount Vesuvius in 79 AD*

LUNCH BREAK, 12:00–1:00

**SESSION III:
GIS APPLICATIONS IN THE SOCIAL SCIENCES AND HUMANITIES**

Yang (Cindy) Shen, *The Global Spatial Distribution of Economic Activity*

Yibing Shen, *Mapping Industrial Capitalism in Early Twentieth Century China*

Malay Firoz, *The Nepal Earthquake: A Spatial Representation*

Scott Frickel, *Spatial Analysis of a Regulatory Knowledge Gap: Methodological Contribution to Social Studies of Ignorance*

**SESSION IV:
HEALTH AND GIS**

Krystal Sarcone, *Mapping Migraine Prevalence and Urgent Care Access*

Sarah Gaskell, *Childhood Injury and Place: Spatial Analysis of the Prevalence of Injuries in Rhode Island*

Karlene Cunningham, *Characteristics of Syracuse Neighborhoods and Their Association with Adolescent Health Risk Behaviors*

Stephanie Chow, *Durable Medical Equipment and Functionality in Older Adults*

PRESENTATION ABSTRACTS

Amanda T. Boston – Mapping Race and Space in Gentrifying Brooklyn

Gentrification has occupied an important position at the nexus of political, social, and economic transformations in cities around the world. While the urban geography literature has generally regarded it as an entirely class-based phenomenon, in this project I emphasize gentrification's racial dimensions. Specifically, I examine the racially disparate consequences of gentrification and the reshaping of urban terrain in Brooklyn, New York, which has become an international brand, cultural hub, and real estate juggernaut. Brooklyn's status as the demographic center of black life in New York City magnifies the racial implications of that ascent, as historically black neighborhoods that were only recently considered blighted and unsuitable for capital investment have become prime targets for "revitalization" and redevelopment. Using U.S. Census data from 1970–2010, I will map the changing socioeconomic and racial composition of gentrifying neighborhoods such as Fort Greene in order to reveal the speed and viciousness of the gentrification process, and to render visible its consequences for black communities. The resulting displacement of longtime residents, erasure of local histories, and destruction of social networks and community institutions not only raises questions about the fundamental inequalities of capitalist property markets, but also highlights the interlocking nature of racial and spatial justice.

Benjamin Bradlow – Have You Heard From Johannesburg: Inequality in the "City of Gold"

Johannesburg is the urban heart of South Africa, a country that holds the ignominious title of being the most unequal country in the world, in terms of income. For its first century of existence, Johannesburg was planned in successive policy iterations to entrench spatial inequality, especially along racial lines. Here, I examine salient features of inequality in the city in its second decade of democracy. This study is at the scale of the census block using the most recent census conducted by South Africa's official statistics agency, StatsSA, in 2011. In particular, I explore service provision and socio-economic characteristics of neighborhoods across the city. Previous literature has argued that between 1996 and 2001 a process of residential deracialization occurred, and class gained increasing salience as the basis of segregation and fragmentation in the city. In this presentation, I investigate aspects of socio-economic segregation, as well as the spatial connections between socio-economic status and service provision across the city in 2011. This will be the basis of further investigation of public and private investments in urban real estate, and the ways in which socio-economic segregation does and does not relate to investment patterns in the city.

Elizabeth A. Cecil – Śiva and Salt: Religious Life around the Salt Lakes of Northern Rajasthan (7th–10th century CE)

The districts of Sikar, Nagaur, and Jaipur in northern Rajasthan are home to a number of large salt lakes, most notably those of Didwana, Sambhar, and Sikar. These lakes and their environs constituted a critical zone of economic, political, and religious development from the 7th through the 10th century CE as centers of exchange along the northern caravan routes, where trade in salt and other goods flourished. Control over these nodal points and routes served as an important gauge of political power and prestige. Asserting dominance over Sāmbhar and Sikar facilitated the rise of the early Cāhamāna rulers, whose descendants were the Chauhan clan of Rajputs celebrated in the later bardic chronicles of Rajasthan. This flourishing regional economy also

attracted Śaiva religious specialists, who found patrons among the socially ascendant merchant families as well as local artisans and pastoralists. Epigraphic sources and temple iconography indicate that by the early 10th century, lineages of these religious specialists were firmly embedded within the political and economic landscape of the region. These networks, in turn, were instrumental in the creation of monumental temples and monasteries.

I explain the materialization of this distinctly Śaiva religious landscape as a manifestation of far broader efforts to socialize new spaces in the northwest frontier, developments that succeeded in catalyzing remarkable social synergies between individuals and communities from a wide variety of social strata. The collaborative efforts and acts of piety converging around Śaivism, in particular, established enduring institutions and proved a powerful tool for the articulation of political persona and communal identity. This presentation will provide a preliminary analysis of the geographic embedding of Śaiva religious sites within the physical landscape and within regional political and economic networks.

Stephanie Chow – Durable Medical Equipment and Functionality in Older Adults

Durable Medical Equipment (DME) is defined as medical equipment generally used in the home to improve quality of living. Common examples of DME for mobility include canes, walkers, wheelchairs, and motorized scooters. Historically, DME suppliers were able to directly contact patients to sell products, possibly bypassing a risk-benefit discussion between patient and medical provider. Prior research has demonstrated that DME is one of the Medicare service categories with highest area variations in use. Due in part to its lightly regulated structure, the Medicare DME benefits program is vulnerable to abuse, consequently resulting in a rise in aggressive marketing that may push seniors into poor decision-making and healthcare spending through the unnecessary purchase of DME items. The Federal Bureau of Investigation estimated that greater than 61% of Medicare DME payments were made in error, calculated as a net loss of \$27 billion from 2009 to 2012. This pilot project aims to explore the relationship between geographic distribution of nursing homes, healthy aging trends in older persons, and DME supply companies, with the intent to identify target regions for medical provider and community-education programs, and further public policy intervention.

Karlene Cunningham – Characteristics of Syracuse Neighborhoods and Their Association with Adolescent Health Risk Behaviors

Health risk behaviors such as tobacco/marijuana use, drinking, and risky sexual behaviors remain a significant problem amongst American youth. Early initiation of these behaviors is linked with the leading causes of death and disability in adulthood as well as low educational achievement. The health and economic cost of early initiation of these risky behaviors have made understanding the underlying risk factors that contribute to the early commencement of risky health behaviors a public health priority. Epidemiology and population health literatures have demonstrated associations between neighborhood characteristics and health. These associations may be greater for adolescents. This study assesses the neighborhood composition of 250 Syracuse rising ninth graders. Correlations between several neighborhood features such as number of grocery stores, alcohol density, park access and crime statistics with self-report measures of risk behaviors and mental health will be examined. It is hypothesized that neighborhood composition will be associated with key health and wellbeing participant factors. Lack of access to parks, high crime, and limited grocery options will be associated with higher

reports of neighborhood stress, engagement in more health risk behaviors (e.g., tobacco use, alcohol) and increased symptoms of mental distress. Comparisons between the importance of school environment and neighborhood characteristics will also be explored.

Lia Dykstra – The Museum and the Medieval Building: Mapping Trends of Adaptive Reuse in France

In this presentation, I will explore the adaptation of medieval buildings (built c. 1000–1550) into museums in present-day France. France has preserved and reused many of its medieval buildings for this purpose, regardless of the building's larger historical significance. Adapting a medieval building into a museum is not only sometimes more cost-effective than building a new structure but can also attract more tourists to a town or city. Using data I have compiled from tourism databases, I will analyze how many of museums are located in medieval buildings within each region. Going a step further, I will also look at what types of medieval buildings are used as museums and what types of museums are most often located in these adapted buildings. Is there a “proper” medieval building for each museum type?

Malay Firoz – The Nepal Earthquake: A Spatial Representation

The Nepal earthquake, also known as the Gorkha earthquake, struck on 25th April at the village of Barpak, in the Gorkha district of Nepal. Measuring 7.8 on the Richter scale, the earthquake was worst natural disaster to hit Nepal since the Nepal-Bihar earthquake in 1934. To date, 8,658 dead have been discovered and 16,808 injured. In the immediate aftermath of the earthquake, humanitarian organisations collated geospatial information about the earthquake and released it on public databases for analysis. My project for the S4 Summer GIS Institute will use these databases to provide a spatial overview of the damage caused by the earthquake. Using damage assessment data produced by the United Nations Institute for Training and Research (UNITAR), overlaid on general geographic information on Nepal, I will produce maps that correlate attributes of damaged sites with population data as well as topographical features such as elevation, proximity to water and roads, etc. Through these correlative maps, I hope to demonstrate the uneven spread of earthquake-related damage relative to patterns of human settlement and natural resources in the region.

Scott Frickel – Spatial Analysis of a Regulatory Knowledge Gap: Methodological Contribution to Social Studies of Ignorance

This study investigates the spatial nature of “regulatory knowledge gaps” as a contribution to the emerging social science literature on ignorance and undone science. An empirical research program to study knowledge gaps immediately confronts the problem of how to study something that is not there. Knowledge gaps are difficult to track, especially in the absence of social movements organized to make those lacunae visible to the outside world. Even then, systematic data on what does not exist (or exists only minimally) is rare, and scholars are often forced by lack of contiguous chains of evidence to develop arguments based in part, at least, on counterfactual claims. In an effort to overcome such challenges this project introduces a novel quantitative approach and illustrate it with spatial analysis of the Environmental Protection Agency's risk assessment of New Orleans soil and flood sediment following hurricane Katrina in 2005. We use a unique dataset containing geospatial information about EPA sampling locations, current and former industrial facilities, waste sites, schools, parks and playgrounds as well as block-level socio-demographic and environmental data. We analyze this data using spatial

regression to examine the relationship between the *absence of knowledge* about soil quality (e.g. presence or absence of soil testing) and known sources of environmental risk (e.g. industrial sites) and environmental vulnerability (e.g. playgrounds). Spatial relationships among these variables demonstrate the role of ignorance in environmental hazards assessment and provide a formal measurement of the “shape” of regulatory knowledge gaps across urban landscapes.

Sarah Gaskell – Childhood Injury and Place: Spatial Analysis of the Prevalence of Injuries in Rhode Island

In the United States, unintentional injury is the leading cause of death for persons between the ages of 1–44 years. The burden is particularly high in children, where unintentional injury alone comprised 10.43% of the death rate for children under 19 years in 2010. In addition to high mortality rates, unintentional injury bears a particular burden in non-fatal cases as well, accounting for 9,038,763 cases seen in emergency departments nationwide between 2001 and 2012. Common injury mechanisms seen in emergency departments during this time included: suffocation, drowning, fire and burn injuries, and injuries as a result of motor vehicle transport. These injuries, however, are preventable and prior literature has shown that targeted community-based interventions may reduce the prevalence of injury within communities. Targeting these interventions to regions with the highest burden may further reduce the prevalence of these injuries in communities. Therefore, understanding the location and population that unintentional injury affects is critical in focusing intervention efforts and educating on the prevention of injury. Using hospital admissions data and ArcGIS software, I will construct digital maps to analyze the frequency and location of water-related injuries, such as drowning, throughout Rhode Island, in an effort to identify communities in the state where a targeted intervention might have the most benefit.

David Hochfelder – The Challenges of Digitally Reconstructing a Demolished Streetscape—The “98 Acres in Albany” Project

In 1962 the state of New York condemned 98 acres of downtown Albany, New York, appropriating 1,200 buildings and displacing 3,300 households comprising 9,000 individuals, to build a futuristic state capitol complex. For the past fifty years, the Empire State Plaza has remained controversial. In 1974, for example, former governor Nelson Rockefeller labeled the demolished area “one of the nation's worst slums,” while a local filmmaker recently condemned the project for having “sterilized the cultural and ethnic heart” of the city. The goal of the 98 Acres in Albany project is to foster a more informed discussion of this specific project and of the cost and benefits of urban renewal generally. We will do this by digitally reconstructing and repopulating this demolished streetscape. We are able to do so because of a trove of photographs that document the exteriors of every structure on the eve of demolition, along with NYS Archives and Albany *Times Union* photographs that depict area residents and business owners in their homes and businesses.

We will use a Sanborn fire insurance map, updated through 1961, as the interface through which viewers of the website can access these photos. In addition, we plan to map demographic and public health data to obtain as full a description of the area as we can. We also intend to collect oral histories from neighborhood residents to create “memory maps” of the area. We hope that this project can serve as a model for researchers to reconstruct other neighborhoods around the country that were lost to urban renewal. The immediate mapping challenge we face is that the

entire 98-acre area no longer exists. Thus, we will need to geocode all 1,200 structures, although those structures and the accompanying streetscape have disappeared. My presentation will introduce the project and discuss this particular mapping challenge.

Jessica Katzenstein – It’s a Fine, Fine Line: Mapping Military Equipment Transfers to U.S. Law Enforcement through the 1033 Program

Since 1997, the 1033 Program – the U.S. Department of Defense’s Excess Property Program (DoD 1033) – has allowed local law enforcement agencies to request surplus military equipment free of charge, minus the cost of shipping, to keep and use on permanent loan. The police response to protesters in Ferguson, MO in 2014, complete with armored vehicles, drew intense popular scrutiny to this program. Its position – at the intersection between U.S. wars abroad and counter-terror and counter-drug policing domestically – makes it an important program to examine in order to better understand the connections between foreign and domestic security policy, and between state protection of, and violence against, civilians. This project draws on the wealth of data released by the Pentagon on equipment transfers to law enforcement agencies across the country since 2006. It maps these transfers across time and space, charting the program’s national expansion. It also highlights where controversial or expensive equipment, such as Mine-Resistant Ambush Protected vehicles (still permitted under the White House’s new limits on the program), has gone. Finally, it scales down to a local level, focusing on the area around my field site (Baltimore, MD), where I attempt to trace whether equipment transfers and crime rates appear to be correlated.

Eleanor Martin – The Eruption of Mount Vesuvius in 79 AD

The eruption of Mount Vesuvius, a volcano located in southern Italy, in 79 AD resulted in the massive destruction of the surrounding area and caused the deaths of thousands of people. Occurring at the height of the Roman imperial era, it continues to be one of the best-known natural disasters in European history, because the resulting ash and lava buried and preserved the nearby Roman settlements just as they were on the day of the disaster. Pliny the Elder, a Roman author and natural historian, and his nephew, Pliny the Younger, observed the eruption from Misenum, a town within a safe distance from the mountain. Pliny the Elder died attempting to observe what was happening at a closer distance and to rescue those trapped in the towns nearest to the volcano, but his nephew lived to write a contemporary account of what happened during and after the eruption. This project illustrates data of the geography of Mount Vesuvius and the area affected by its eruption, as well as what Pliny the Elder and Pliny the Younger would have seen from Misenum as they watched the eruption occur.

Abhilash Medhi – The Anatomy of Raiding in Colonial Northeast India

Starting from the second quarter of the nineteenth century, inhabitants of the northeastern frontier of British India responded to their incorporation into an imperial political economy through a variety of means. They resisted the introduction of European capital, and sought to escape itineraries of imperial capital flow by relying on their connections with traders and merchants from Southeast Asia. But most of all, they raided British garrisons and commercial centers. Raiding constituted, on part of the tribal communities of northeast India, both a protest against the imposition of colonial rule as well as part of an attempt to benefit from the circulation of goods and commodities in the region. For my project, I shall plot the sites of close to sixty raids that took place in northeast India between 1834 and 1900. I shall overlay these sites on two

maps, an index map produced in 1922 by the Great Trigonometrical Survey—a colonial project which endeavored to demarcate British territories in India throughout most of the nineteenth century—and a topographical map of India. With the first overlay, I aim to draw attention to the extent to which economic activity in the region was determined by ecological considerations. The colonial state encouraged settled agriculture in the valleys of northeast India whereas in the hills, communities relied on subsistence farming. I shall demonstrate that the foothills then functioned as a locus of commercial exchange and the most popular site of raiding. Hill folk and plainspeople routinely traded produce in foothill markets but in lean seasons, the former raided the latter to capture food grains thereby provoking the colonial state to undertake punitive expeditions against them. With the second overlay, I seek to emphasize how incessant raiding, among other factors, informed actions of the colonial state in northeast India. Colonial administrators did not subject the region from to practices of governmentality that were in operation in most other parts of their Indian empire at the time. Instead, their policies along the frontier inhabited a continuum ranging from coercion to conciliation and non-interference to collusion. The outcome was a bizarre combination of western penology and local social practices married together in an uncomfortable alliance by the utilitarian demands of liberal empire.

Krystal Sarcone – Mapping Migraine Prevalence and Urgent Care Access

For the general population access to healthcare is a significant area of focus, as the discrepancies in such can often result in poor outcomes and death. The concept of access comprises several interactive elements and layers of complexity including public transportation infrastructure, appropriate ratios of available providers, and simply, distance to care. Though that list is not comprehensive, we furthermore have variations in the type of care one would need to access, whether it is primary, specialty or urgent care. For this project I explore the last of those three and map where urgent care centers are located throughout Rhode Island. Integrating data on migraine prevalence in the state I hope to gain better insight as to how these two variables interact and how it graphs geographically. The figures gained from the resulting spatial distribution helps build the conceptual framework for a larger project in which I hypothesize that utilization of Emergency or Urgent care for migraines is not the result of poor access but other inherent undesirable characteristics of its design.

Yang (Cindy) Shen – The Global Spatial Distribution of Economic Activity

This project studies the global distribution of economic activity, as proxied by lights at night, across 250,000 quarter-degree grid cells. In the economic geography and economic growth literature, first-nature geographic characteristics, i.e. characteristics that are linked to the physical landscape, are considered as an important force that shapes the spatial distribution of economic activity. What these characteristics are, how they are spatially distributed, and how well they explain the variation in lights across the cells are the focus of this project.

The measures of first-nature characteristics are divided into two categories: those primarily important for trade with the rest of the world (for example, proximity to navigable rivers and coasts), and those primarily important for agriculture (for example, temperature, precipitation, and land suitability). I begin with a description of the lights data and the list of physical geography measures used in this study. Using ArcGIS, I construct maps to show the spatial distribution of night lights and several components of the first-nature attributes. I then run regressions to examine the effect of each individual geographic characteristic on the intensity of

economic activity and to determine the fraction of variation in lights that can be explained by these characteristics.

Yibing Shen – Mapping Industrial Capitalism in Early Twentieth Century China

The entry of modern industries to an ancient empire involved the rise of new core areas and the decline of old ones. In his famous book *The City in Late Imperial China*, William Skinner proposed the well-known “regional approach”, claiming that China should be studied not according to its administrative borders, but instead by eight “physiographic macro-regions”: North China, Northwest China, Upper Yangze, Middle Yangze, Lower Yangze, Southeast Coast, Lingnan and Yun-Kwei. Each region has its own core, semi-periphery and periphery. However, Skinner’s work was largely on the socio-economic conditions in 1839, and his maps and quantitative statistics only portrayed population density, but not trade, commerce and technology. How did this landscape change over the next 100 years after the flooding of foreign goods and the entry of modern industries to the agrarian economy? In this project, I will draw on various archives to map the allocation of industrial capital and industrial output in the early twentieth century China. Particularly, I will focus on textile, machinery and mining industries: textile is the leading industry in the early stage of industrial development, and the other two concern the production of capital goods. I will examine whether or not the industrial development still accorded to the eight physiographic macro-regions and how modern industry led to regional inequality. Qualitative evidences will be used to explain the variances.

Amanda Zagame – Is Re-Segregation on the Rise in Boston?

In a *Boston Globe* article published a year ago, Evan Horowitz claimed that Massachusetts, regarded as highly liberal and celebrated for its education programs, has experienced a resurgence of segregation among its public schools, particularly those in low-income areas. According to a study conducted as part of the University of California’s *Civil Rights Project*, the white share of Boston’s public school enrollment decreased by more than 10% from the 1989–1990 school year to the 2010–2011 school year, while nearly 70% of Boston’s black students were enrolled in majority-minority public schools by 2010 (2013). The study also revealed that “the typical black student attends a school with 58.7% low-income students and the typical Latino student attends a school with 63.5% low-income students, which is two to three times the share of low-income students in schools attended by the typical white student (21.9%)” (2013). This current study will further examine the demographic characteristics of the City of Boston and its public and charter schools. I will be using 2010 Census data to examine the demographic characteristics (including income and race/ethnicity) of Boston residents at the block-group level. Doing so should start to reveal the level of segregation in the city as a whole. I will then map Boston’s public and charter schools at their exact addresses. Using the Massachusetts Department of Elementary and Secondary Education’s profile search tool, I will extract the race/ethnicity distributions for each school in 2010. This should allow me to characterize each school by its level of segregation and compare it to the characteristics of its location. I then plan to repeat this process with the 2000 Census data in order to examine trends over time.