# RECLAIMING TERRITORY: STATISTICS, QUANTITATIVE METHODS, AND ONLINE TEACHING

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I would like to begin by describing a small research project that my colleague, Fernando De Maio and I are developing: we collected and content-analyzed 46 syllabi for statistics for sociology courses—recent courses, offered in the U.S. and Canada, mostly at large universities. We looked for indications that the courses included critical thinking about statistics and engagement with public issues. Our results were surprising—only about a quarter of the syllabi mentioned critical thinking about statistics itself, and only four mentioned the importance of statistics in public discussion! This little finding suggests that we still have a ways to go in helping students in social-science stats classes feel confident about using their skills and knowledge in public discussion, civic engagement, and political participation.

## The "human sciences"

My remarks today are about that wide range of fields that are not natural sciences but nonetheless make claims to being scientific—fields such as sociology, political science, psychology, public policy, management and administration, marketing, criminology, and public health. These "human sciences" or disciplines present special challenges to teaching for social justice. As progressive scientists, we need to do two things at the same time: recognize these fields as legitimate fields of scientific inquiry but resist efforts to turn them into knowledge for manipulating, monitoring, and controlling human beings.

## *Techne* and its discontents:

At the philosophical heart of the problem lies the concept of *techne*, the Greek word at the root of technology. It means more than new machinery—it means a practice of applying systematic knowledge to bring into being a new state of affairs, a new condition, in the material world. In the course of the last century, this term and practice have come under close, harsh scrutiny, especially when knowledge is applied to human beings and not only to inanimate and non-human slices of nature. Comte's cheery slogan of "progress and order" hailed a positivist orientation, but theorists such as Nietzsche, Simmel, Weber, and Marxists were deeply skeptical about the project of applying science to human action, though in very different ways. More recently

several noted theorists have questioned the very idea of *techne:* One critical strand runs from Nietzsche to Foucault and his negative view of the human disciplines, another from Weber's analysis of instrumental reason to George Ritzer and his "McDonaldizaton" thesis (that all modern practices of management and administration are designed to maximize efficiency, predictability, control and calculability ….). Another strand of the critique goes from Martin Heidegger to Herbert Marcuse and yet another, more Marxist-inflected one, stems from Theodor Adorno. Heidegger and Adorno's ferocious hostility to each other did not prevent them from agreeing on their fundamental concerns about *techne,* and indeed Marcuse synthesized the perspectives of both older theorists in his passionate *One-Dimensional Man.*

Two key themes appear in this body of theory: One is that t*echne* dehumanizes human beings turning them into things, objects of management, control, and manipulation; and the other theme is that quantified knowledge, especially in the human disciplines, is so intimately embedded in capitalism that it will be virtually impossible to extricate it from this matrix and redirect it intellectually and politically. The latter position is not only that of many Marxists, but is most eloquently expressed by a theorist who was not a Marxist at all—Georg Simmel:

> The modern mind has become more and more calculating. The calculative exactness of practical life which the money economy has brought about corresponds to the ideal of natural science: to transform the world into an arithmetic problem, to capture every part of the world by mathematical formulas. The money economy has filled the days of so many people with weighing, calculating, with numerical determinations, with a reduction of qualitative values to quantitative ones.—Georg Simmel, from "The Metropolis and Mental Life" (1903).

But not all critical theorists and activists agreed with this position. Walter Benjamin saw a politically liberating influence in the application of technologies that transformed works of art into mechanically reproduced products—he saw it as a demystification of art that could have liberating effects on our thinking. And certainly Lenin, when he suggested that communism meant soviets and ***electrification*** was arguing that the political context of technology is what matters, that technology is not inherently a handmaiden of capitalism.

**Science beyond positivism?**

In the context of a session on teaching I would like to elaborate one more critique of the massive introduction of quantitative methods and a natural science model of science into the social and behavioral sciences: Namely that it often produces bad science and bad scientific pedagogy. Positivist sciences and the practices of positivist thinking mean reduction of complexity to simple metrics, history to current "facts," human existence to manipulated and objectified sources of data, and learning to uncritical regurgitation by multiple-choice quizzes.

A side note: No one admits to being a positivist anymore, but a glance at journals in many fields—especially but not only psychology—reveals a vast sea of positivism, characterized by

an obsession with metrics and measurement, an uncritical reduction of qualitative difference to quantitative terms, and an obliviousness to historical contexts and time frames. I am not referring here to neuroscience (though some of these issues apply there as well) but to a plethora of experimental results that are reported without a critical analysis of the social and historical contexts in which they were conducted. Social and behavioral scientists may not admit to being positivists, but they are positivists in practice, and appear to be unaware of alternative ways of conceptualizing scientific inquiry, such as dialectical reason or critical realism—terms that were not introduced in their own education and training.

**How to reclaim lost territory? Science teaching, social justice, and critical thinking:**

Thus to reclaim the territory is to do three things at once: (1) Build scientific knowledge that is not positivist, that is systematic and quantified, but remains mindful of historical contexts and qualitative difference—and this requires critical thinking about the application of science to human actions and about specific techniques, for example, in statistical data analysis. (2) Look critically at the ends for which knowledge is being produced and applied; and (3) reflect on what it would mean to dis-embed science—and specifically human sciences—from their intimate and asymmetrical relationship with capitalism. These are three intertwined but not identical challenges.

In short we need to encourage students to--

- Question positivism and develop a more complex understanding of science as inquiry into an objectively-existing world, using a framework such as dialectical reason or critical realism.
- Understand the historical context of human knowledge and action—and even in the natural sciences, understand the time-bound context of "facts."
- Consider how knowledge is being used in the existing political economy and class structure.

**Stats pedagogy—an example:**

Just to give a few examples of how to make a small start on this project in the framework of teaching stats and methods: The instructor can:

- Encourage students to engage with real data sets, especially data that reveals inequality—for example in health outcomes and in global health indicators (my colleague Fernando De Maio has developed stats pedagogy to challenge inequalities in health).
- Ask students to consider different interpretations of data so that they become more critical consumers of it themselves and more able to see that the issues are very rarely in

the formal calculations and almost always in operational variables and interpreting findings. Public hearings or trials can be recreated and role-played in the classroom, for example, the Merckx-Vioxx case, the question of whether the Hanford nuclear facility contributed to cancer deaths downstream, the Chicago petcoke ban issue, and so on. In other words, students can see that statistics are not simply a matter of memorizing formulas, but are subject to disagreements and contending interpretations and are a vital part of public debate and civic engagement.

- Ask students to examine how variables are defined, how operational variables are constructed, and what the implications of different definitions are for the research outcomes and the social implications of the study. When they are asked to design a study, they see the implications of variable construction for the outcomes. An excellent example of this issue is the question of how "race"—a socially constructed category—is used and interpreted in biomedical data. On the one hand, it is important to the goal of social justice to understand "racial" disparities in health outcomes, but on the other hand, these differences should not be interpreted as biological "facts" –nor do we want to reify race as a natural category. (See selections in Vicente Navarro and Carles Muntaner, *Political and Economic Determinants of Population Health and Well-Being*, Baywood Publishing Company, 2004 for a lively debate on this matter.)
- A good way of encouraging students to think about how data are produced is to start a course with a small local research project in which students identify research questions, define the conceptual and operational variables for hypotheses, and collect data from a sample—steps in research that reveal the high degree to which data are produced and not just collected.
- Ask students to trace the uses of data, exploring who makes use of the data for what types of arguments and for which positions in public debates.

Statistics pedagogy can encourage structural thinking. Place/organization-level analysis and hierarchical models of causation encourage students to see that structural effects constrain the effects of individual effort and motivation. For example, the causes of good school performance include the influence of families, schools, and neighborhoods, not simply the individual child's wish to succeed. Examining structural forces in causation encourages our students to avoid a faulty "psychologism" or "individualism" -- that "everything is up to the individual." Instead we begin to see structural effects that operate regardless of the individual, not in order to sink into fatalism but to think about how to change these "circumstances not of our own making."

We should encourage students to think about using data to make arguments, to understand data analysis as a ***political activity***. For example, I like to use Tufte's brilliant discussion of the data analysis and chart preparation that preceded the Challenger launch decision and disaster. When we looked at his work, we instantly saw that the charts that were actually constructed are virtually impossible to interpret, whereas when we saw the alternative chart that Tufte prepared every single student in my stats class (a supposedly "math averse" group and certainly not rocket

scientists) could instantly recognize that low temperatures were associated with O-ring damage, and that a temperature near freezing could be expected to be associated with extensive damage. In class I emphasize the political context more insistently than did Tufte, linking the charts to Charles Perrow's claim that the disaster was the result of pressure from the Reagan administration to launch the shuttle—in the absence of clearly readable results about the effects of temperature, it was hard for the engineers to say "no" to this pressure.. A well-designed analysis can be a source of strength in resisting power.

We have to emphasize the crucial importance of seeing all human "data" as historically contextualized. Findings that pertain to human beings are always in flux and that they fade as the context changes. Only a theory that is historically grounded can make sense of these changes. Human facts are not fixed and static. I made this point recently with a wacky steam-punk story that lampoons the Big Data hype, the absurd idea that correlations can substitute for theoretically grounded explanations and that they have a lasting truth. The story is about the Germans' Big Data analysis of bayonet deployment at the end of the 19th century. (There is not enough space to insert it here, but if you contact me at rgarner@depaul.edu, I will send it to you.)

Finally, we need to stimulate our students to think about the question whether our findings are immutable-- inconvenient facts that we must accept--, or situations that can be changed by praxis. This is of course the disagreement between Max Weber (who believed that scientists must accept "inconvenient facts" that undermine their cherished values and political positions) and the Marxists (who believe that facts are not fixed and can be altered by praxis—not arbitrarily or in an unlimited degree, but nevertheless substantially). Are global health inequalities, global warming, or the high US unemployment rates fixed facts of nature? As Scrooge says to the Spirit of Christmas Yet to Come when he sees the absence of Tiny Tim and the scavengers stripping his own deathbed Are these the shadows of things that Will be or the shadows of things that May be, only?'

**Online teaching: threat or promise?**

Similar considerations apply to a new application of technology—the online course. (I am very happy to say that DePaul University has a wonderful training program for online instruction and is very supportive of developing it as a serious teaching method.) Online teaching is a powerful new development, full of threats (such as global competition among educational institutions) and promises (providing quality education to people who had previously been shut out for any number of reasons). To make it a resource for social justice we must not turn away from it (because to reject this new pedagogy is to lock oneself into a "panic room"—a safe but isolated ivory tower) but need to work to make it fulfill its promise in terms of --

- Content choices--
- Readings, activities, etc.

- Assessment choices—for example short papers rather than multiple choice quizzes (and that also means limiting class size for for-credit online courses).
- Posing discussion questions that promote critical thinking.
- Lecture content—perspectives, framing, etc.
- A sense of freedom that comes with distance and partial anonymity can lead to better discussions –freeing of the imagination.
- Potential for reaching many new people--

I would like to close by mentioning Marxist scholar Fredric Jameson and what he terms "new cognitive maps"—we have to explore and understand the new terrain of knowledge and pedagogy, scout it out, and be prepared to take action to claim it politically.