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The National Character of Science:

Statistics in modern Japan

A dissertation submitted in partial satisfaction of the

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in Sociology

by

Jennifer Alycon Winther

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ABSTRACT OF THE DISSERTATION

The National Character of Science:

Statistics in modern Japan

by

Jennifer Alycon Winther

Doctor of Philosophy in Sociology

University of California, Los Angeles, 2014

Professor William Roy, Chair

To examine the relationship of ways of knowing with ways of governing, I examine the social and political development of Japanese statistics and find that science is not universal and objective, but profoundly local, shaped by the national cultures and histories in which it is institutionalized. The present research attempts to explain the rise of statistics as a diverse but integrated field of expertise shaped by the interactions of political discourse with the development of scientific ideas and the active development of institutional structures.

Focusing on two periods of social transformation in Japan, I investigate two empirical questions: How did statisticians define their work intellectually in each period? With what strategies and in what organizational locations did statisticians institutionalize their specific forms of knowledge production? By investigating these two specific questions, I have tried to emphasize the process of developing statis**ti**cal ideas themselves in particular contexts rather

than treat statistics as a universally defined body of knowledge that develops universally in any social environment.

Data for my analyses consists of a variety of primary material in Japanese, translated by the author, ranging from original publications of scholarly debates in the late nineteenth century compiled by the Central Statistics Bureau, government reports, historical documents from professional associations and state agencies, and a set of interview transcripts from the postwar period. I also bring together scholarly studies heretofore separated by disciplinary boundaries of management studies, history, sociology, and Asian studies.

Drawing largely on Foucaultian ideas of techniques of power, and further specifying Bourdeusian field theory to account for the unique position of statistics among professions more closely tied to the political rather than the economic sphere, I demonstrate how the development of statistics in Japan relied more on political capital, thus institutionalizing scientific and political authority in specific ways.

The dissertation of Jennifer Alycon Winther is approved.

Stefan Timmermans

Leisy Abrego

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2014

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Chapter 1. Knowledge and power.

At one time, a close relationship between science and the state was celebrated as the triumph of secular reason over traditional, divine, and spiritual sources of authority. Centuries later, the relationship was condemned as an abhorrent abuse of power as scientists in various places joined with state governments to develop and deploy weapons of mass destruction, wipe out whole races of people, or pollute the environment through industrial development. Though the relationship between scientific authority and modern democratic governance was once considered to be a natural one, or at least a positive alliance, history has proven that there is no one-to-one correspondence between science and democracy. The challenge for social scientists is to explain how, under what conditions, and with what consequences, scientific and political authority comes together historically.

In the modern period, statistics is one example of how scientific and political authorities have been joined. Particularly as a tool of state building, statistical categorization and data collection has provided both conceptual and procedural ways to facilitate political centralization by ordering land, people, and resources into component parts of the national entity. Because statistical data collection and analysis carried the cultural authority of objective science, they provided means for new states to develop and evaluate policy understood to be rational, and thus modern. Even beyond providing a tool to develop internal policy and infrastructures, statistical data collection has also served as link among states by providing a common, standardized language. Adoption of internationally recognized classification standards provides at least symbolic evidence of a nation's commitment to modern, rationalized governance within an international community.

Introduction

Despite varying local political histories, statistics has lent symbolic authority and legitimization to state-building projects across the globe through the claim of scientific universality and objectivity. But the place of statistical expertise within administration and the structure and content of domestic statistical systems vary widely according to local histories and administrative structures. In addition to local factors, the timing of state development within particular configurations of international relations has played its part in shaping statistical systems, as have the timing of intellectual developments within the field of statistical work. This dissertation takes as its starting point the idea that historical variation is both empirically interesting and highly relevant for developing more nuanced frameworks for studying the relationship between ways of knowing and ways of governing.

The development of statistics in Japan is particularly interesting, though not because Japanese statisticians are credited with important theoretical contributions central to the development of the field on an international scale, or that other states looked to the Japanese model for developing their own statistical systems. In fact, neither of these occurred. The Japanese case, rather, demonstrates how science is profoundly local, shaped by the national cultures and histories in which it is institutionalized. In so doing, the Japanese case provides challenging evidence to refine theoretical frameworks based on western experiences that explain disciplinary and professional development, and the structure of expertise.

In the empirical chapters that follow, I will explain the unique disciplinary development of social statistics, an intensely political project grounded in science and socialism, as well as patterns of professional development that vary considerably from western ones by being linked to, rather than separated from, government administration. Despite the connection to administration, Japanese statisticians were successful in developing an infrastructure for

statistical work beyond the academy and administration. Rather than weakening their authority by diluting the social value of expertise, expanding the field strengthened the authority of statistical knowledge as a practical tool of economic development. Japanese statisticians have always been responsive to political development, and in fact, I argue, were instrumental in realizing transformative political agendas in two periods of dramatic social change. Committed to both rigorous scientific research and national development, Japanese statisticians positioned themselves strategically to create a powerful and lasting link between scientific and political authority.

Creating scientific authority

Based on Weber's concept of authority, or the ability to command action without the use of force (Weber 1978 (1951): I, 53), contemporary sociologists have defined cultural authority as that which "entails the construction of reality through definitions of facts and values" (Starr 1982: 13) or the "legitimate power to define, describe, and explain bounded domains of reality." (Gieryn 1999: 1) Science is one such system of definitions and rules with which we define reality, and one that commands considerable authority among competing systems. Historians of science have formulated the rise of science as a new way of knowing, a new way of defining and creating reality that was far from simply intellectual. In their seminal study of the relationship between Boyle and Hobbes, Shapin and Scaffer explicit how the stakes of debates on ways of knowing are about "which people, based on their claim to truth or trustworthiness of their knowledge, will be able to claim power" (Shapin and Schaffer 1985).

Introduction

In sociological studies, specifying cultural authority in relation to Weber's definition has in fact been an effort to explain better the nature of professional authority in particular, as the knowledge and judgments of experts, and the solidification of institutionalized communities of experts outside the state, have come to characterize the landscape of modern authority. Starr's account of the rise of professional medicine in the United States characterizes the reception of scientific and specialized knowledge as authoritative to have been facilitated by a breakdown of "traditional certainties" and the need for "sorting out different conceptions of human needs and the nature and meaning of events" (Starr 1982: 19). Social and cultural histories of science also provide compelling details of the rise of professionalism as the deeply committed work of scientists and intellectuals to realizing both scientific and political or social ideas (Porter 2002). Similar to the rise of science in general, the solidification of scientific professions was thus achieved across many fronts of competition for both cultural and social (economic, political) authority, sometimes in very local settings.

Understanding cultural authority to be both about the power to define and about social power in general, empirical studies of how scientific and professional authority has been created lead to questions about how it is sustained. Modern science has developed into a complex system of institutions and rules of behavior committed in some way to the production of specialized knowledge, and much scholarly interest now focuses on the science as work. Studies from this perspective challenge the claim that scientific authority is a product of epistemological status, demonstrating the social, communicative process through which scientific facts are verified (Knorr-Cetina 1999). On the "inside" of science, in labs and research sites, those with the proper credentials follow rules of method and verification, and communicate in both specialized and

everyday language to establish credibility among a community of peers also recognized as experts (Latour and Woolgar 1996).

Just as the "inside" expert determination of facts is social in the manner in which it is verified, so too, argue sociologists of science, is the creation of scientific questions. Kuhn's theory of paradigms suggests that normal science functions by providing whole epistemological and institutional systems of problematics, modes of reasoning and evaluation, and sets of relationships among actors for validation (Kuhn 1970). Although Kuhn separates the process of discovery from the process of validation, the former being individual and the latter being social, contemporary scholars build from his theory of paradigms to show how the questions that are asked are themselves social products.

Complementing studies that focus on science as work, many sociologists focus on the social infrastructure of science as that which sustains scientific authority (Jasanoff 1987: 196; Swidler and Arditi 1994). Echoing frameworks from the early and mid twentieth centuries (Manheim, Merton, Mills, Kuhn), contemporary studies of science continue to separate the processes of discovery and validation in science at least analytically, choosing to focus on one or the other. Much of what scientific authority is made of, argue those focusing on the "outside" infrastructure of modern science, is the "institutionalized peer review process, norms of practitioners, professional training and networks that control the diffusion of scientific knowledge." (Jasanoff 1987) Scientific authority is embedded in the infrastructure and must be constantly enacted and reinforced by practitioners by positioning themselves and their work strategically.

Some of the most recent studies in the sociology of scientific knowledge, in fact, aim to demonstrate more specifically the ways that infrastructure and ideas are co-produced, rather than

one shaping the other unidirectionally (Jasanoff 2004). Evans, for example, explains how scientist led government funding in the United States from the middle of the 20th century established a great deal of autonomy from outside interests (military and industry) but at the same time consolidated control and encouraged conformity rather than experimental science (Evans 2007: 1). His research demonstrates that scientists constrain their own work through government grant reviews, establishing a "limited, canonical set of [theory-driven] puzzles" that push research towards methodologically conservative, confirmatory science (Evans 2007:2). On the other hand, industry based scientists protect their freedom to pursue more speculative, data-driven research specific to local settings. In another example, Camic and colleagues focus specifically on individual social scientists who define the boundaries and intellectual scope of their disciplines against each other according to competition in local institutions, thus defining both the methodological parameters of particular social scientific disciplines and the infrastructure that support them (Camic 1995; Camic and Xie 1994).

Thus, although scientific authority is recognizable globally by comparable institutional structures, credentializing bodies, rewards systems, professional associations and publications, and codes of behavior (Featherman and Vinovskis 2001), what drives sociological studies of scientific authority is the question of how it varies – how the historical development of ideas contributes to the development of institutions in local and national settings (Desrosiéres 1998). Set within national systems, scientific authority depends not only on peer validation, but on the success or failure of scientists in persuading decision makers and the public that their findings are correct and the norms of procedure are legitimate (Jasanoff 1987). Our acceptance of scientific authority, argues Starr, is largely a dependent relationship that allows scientists considerable authority even when individual scientific claims of fact are questioned in the media,

in the courtroom, or in congressional hearings, for example (Fienberg 1997; Meier 1986; Starr 1982). For all the epistemological challenges and our recognition of the social sources of scientific knowledge, our confidence in it and dependence on it is part of the system that sustains its authority.

From discourse to tool

To understand how science in general and statistics in particular can be challenged locally yet remain so powerful socially, I want to emphasize the role of discourse for creating and reproducing cultural authority. In its rise to a system of authoritative knowledge, Inkster argues, "Science was not a counter-culture, nor was it integral to the ruling cultural stock. Rather, science was a malleable thing, allowing much creativity, individuality and competition, representing a means of social mobility to some, of social expression to others, a measure or tool of socio-intellectual control (through sanctions and rewards) to yet others" (Inkster in (Outram 2003). Restating this in Swidler's formulation of culture as a tool kit, this characterization of scientific discourse offered a set of generalizable definitions of the world that differently located people could use to reorganize social life and reform relationships of authority and cooperation (Swidler 1986: 278-80).

Zeroing in on the emergence of professional groups that have come to hold such power in modern societies, and on statisticians in particular that are the focus of this research, I want to specify Swidler's (and Starr's) formulation of culture as discourse further by locating it within modern institutions. Like Fourcade-Gourichas's economists, the statisticians I study built their professional infrastructure and the cultural authority of their discipline, or field of scientific work,

simultaneously. The conceptualization of culture that best fits this empirical history is "a 'grounded, institutional' conceptualization of culture, where culture is embedded in social structures and institutions such that enactment of culture is constitutive of the structures themselves" (Fourcade-Gourichas 2000). Transforming statistics from a new way of knowing – a potential source of cultural authority – into a powerful tool of institutionalized governance was an achievement in Japan similar to experiences around the globe that Foucault characterizes as the emergence of a new eras identified by "the systems of knowledge, classification, and logics used as techniques of power" (Foucault 1973).

Many others have documented the history of statistics as a transformative tool of modern science, statecraft, and social relations (Porter 2002). Desroisieres (Desrosiéres 1998) has even summarized shifts in the organization and aims of governance as corresponding to successive definitions of statistics: in the eighteenth century, statistics was an administrative activity for describing the State, in literary terms and eventually, numerically; in the nineteenth century, statistics was a solely numerical tool for describing the state; in the twentieth century, statistics developed into "a set of mathematical techniques for numerical analysis of data that could be of the State, biology, physics, or anything else that has been categorized into something that "holds together" like crime rates, GNP over time, etc." (Desrosieres 1991).

A number of sociological and anthropological studies have focused on how ordering societies through statistics enabled newly centralizing states to restructure social relationships and institutionalize symbolic representations of authority over the national and colonial territories they aimed to control (see (Anderson 1991; Loveman 2001; Nobles 2000; Patriarca 1996; Stoler 1995; Tooze 2001). Ordering the world through classifications and standardized measurements for land, wealth, people, and production, in other words, introduced and solidified

a manner of governance that historically tipped the balance of power in favor of modern centralized statecraft from varied local systems (Anderson 1991; Asad 1994; Scott 1998). Anderson explains how this was accomplished by sustaining the imagined nation through discourse and continued deployment of persuasion representations: printed stories of the nation, the map, and censuses (Anderson 1991). For Scott, the theme of legibility is the same – simplify, quantify, sustain representations to reorder social relations and sustain those in power who can design and control the production of this type of knowledge, this way of seeing the world (Scott 1998).

In addition to the power wielded by control over the production and content of knowledge about citizens and the national space, scholarship on statistics and states emphasize the ways that statistical work established new modes of administration that subsequently affected the development of policy according to particular national histories (Kuhnle 1996; Mitchell 1988; Mitchell 2001; Tooze 2001). For example, Kuhnle (Kuhnle 1996) demonstrates how the presence of statistical offices, and the nature of the data they collected in Denmark, Sweden, and Norway, shaped the kinds of social welfare policies created by each government respectively. Statistical work, in other words, institutionalized and enabled a link between the way that things are categorized for data collection and the development of national welfare discourses and industrial policy. Official categories and styles of research reach the academy as well, shaping the development of disciplines such as demography and objects of study such as sector analyses of the economy, trends in health, etc. (Conk 1978; Foucault 1973; Mitchell 1988; Schweber 2006). From setting administrative tasks to affecting the development of academic research, statisticians have created new ways for states to generate knowledge and evaluate their own policies, determine interventions, and guide the production of knowledge outside government

agencies. These lines of research speaks directly against the claim that statistical data collection and dissemination is a mode of transparent government (Prewitt 1987), but rather provides empirical evidence on the ways in which scientific ideas have been transformed in to tools of power by embedding them in social institutions where they are subsequently enacted in often mundane procedures (Dobbin 1994; Scott 1998).

Empirical studies on the scientific discourse and practical procedures of statistical work that facilitated its linkage with political power thus explicit how the results disseminated from official statistics represent cognitive commitments that establish important points of reference for setting political agendas, forming and evaluating policy, setting norms and standards, and impacting balances among competing groups (Anderson 1991; Asad 1994; Curtis 2001; Desrosiéres 1998; Loveman 2001; Patriarca 1996; Tooze 2001; Woolf 1989). In modern societies, only the government maintains the power to redraw boundaries between races, ethnicities, or occupations and thus to give or take away rights according to those attributes or affiliations (Anderson and Fienberg 1999; Curtis 2001; Loveman 2001; Mitchell 1988; Nobles 2000; Patriarca 1996; Peterson 1987; Smith 1992). Given its role in shaping nation states and the social structures and relationships within them, my study follows many in focusing on both the development of the national statistical system in Japan and the position of statisticians in configurations of both scientific and political authority.

Categorizing statistics

The way we frame the study of statistics says much about what we think its social contributions have been. In contrast to the powerful way that statistics have affected the

development of national territories and state administrative organs, our scholarly evaluations of statistics as a profession or discipline in itself proclaim less success, less transformative power. Nonetheless, studies of statistics as profession or discipline provide important conceptual elements that I want to use to build a framework for understanding statistical work in Japan that spans institutional spheres.

Based on his brief historical account of statistical work in early 20th century America, Abbott (Abbott 1988) argues that statistics in the United States is an unsuccessful case of professionalization, or closure, because its practitioners are more closely allied with other professions, and statistical work is just a set of skills that can be carried across different spheres of work. He marks this professionalization failure at the point where statistical work split vertically between a mathematically oriented elite and the masses of workers with lesser technical skills (p. 229). The split, he argues, was a response to external technological developments in the early 20th century that aided tabulation and calculations. The cost of failing to adopt new technologies at all levels of statistical work was to lose the patronage of government and business. The result was the development of an academically based mathematical statistics and an administratively based group of descriptive statisticians – an occupation split hierarchically rather than integrated as a profession.

For Abbott, whose objective is to demonstrate the analytic power of professions as a system in itself, particular professions relate to external spheres such as government, media, or the public, only for purposes of legitimating the jurisdictions they claim over a given set of knowledge and skills that defines each profession (pages 64-66). In the case of statistics, however, others have shown that it has developed from, and has always been integrated into, multiple institutional spheres (Desrosiéres 1991; Donnelly 1998; Porter 1995). Using a

framework for understanding the development of professions alone, as conceptualized in the United States, mistakenly relegates universities to credentializing organizations rather than an equally powerful site in which knowledge is generated. In other national settings, where different structural relations obtain among government, academia, and corporations, the move of some statisticians from academia or government to corporations is not necessarily deprofessionalization as Abbott's framework would suggest (Fourcade-Gourichas 2000: 28). Given that postwar statistics developed under the American occupation, however, Abbott's case of professionalization failure might be comparable despite the narrow focus on professions only. If the Americans had been completely successful in replacing the statistical (and political, economic, etc.) system under the Occupation, then one might expect similar institutional and professional developments or failures as in the American case. In fact, despite the efforts of the Americans to introduce their own structures, values, and policies, Japanese postwar development reflects both native and foreign elements, including a strong profession and a uniquely political social science discipline based on statistical methods.

Concerning the professional development of statistics in particular, not only were there concerted efforts by some to introduce new intellectual and technological advances at every level (although not without resistance), statistical work, aided by the Americans, expanded into the corporate sector with relative ease, transforming Japanese industrial production with a new institutional culture and configuration of authority. The diffusion of mathematical statistics in both the academy and administration was in part due to a generational difference among elite statisticians who orchestrated postwar reconstruction. The expansion to the corporate sphere was aided by professional networks beyond statisticians that included engineers and other scientists. It depended on the successful reconfiguration of factory work relations, and was conditioned by

the broader culture of postwar economic reconstruction – factors clearly beyond a narrow analysis of professionalization alone. As already stated, these developments emphasize how statistical ideas have historically originated in various institutional spheres and have developed into a discipline or profession in a rather piecemeal fashion, varying significantly across national contexts. Although many of Abbott's explanatory concepts are useful (external technological development, competition for jurisdiction, etc.), confining statistical work to its professional manifestations alone erases much of what explains how statistical ideas have become authoritative knowledge in Japan.

To preserve much of Abbott's conceptualization of the factors that affect professional development and institutionalization, but to consider different relationships and strategic patterns that fit the Japanese case better, I want to draw also from Bourdieu's general theory of fields. Field theory provides a framework and method for explaining societal differentiation, and offers some important insights for understanding statistics in particular. In society at large, and in the semi-autonomous fields of activity of which it is made, there is a basic binary opposition between economic and cultural power (Benson 1998; Bourdieu 1990; Brubaker 1993). Each field of activity reflects this binary relationship in different configurations that actors generate and constantly recreate according to the logics, interests and specific capital that defines their activity (Bourdieu 1990). Using the general theory of fields for empirical analysis is, in short, a mapping exercise (Brubaker 1993). Of particular interest here is the first step of locating the field in relation to others. The field of cultural production is where scientists, artists, writers, and others engage in symbolic production, and is located itself within what Bourdieu refers to as the all encompassing, dominant pole of all fields, the field of power. Reflecting the differentiation between the fundamental binary opposition, the field of cultural production is dominated by

those fields closer to economic power – the economic and political fields – and is also structured to reflect that binary. In other words, within the field of cultural production, those institutions and individuals whose activity is geared toward large scale production are themselves closer to the pole of economic power and those who produce for other producers, who are located closest to the cultural pole (Benson 1998: 465).

The field of statistics is difficult to place, given the various institutional locations it occupies and patterns of production that it encompasses. But this difficulty underscores the importance of structural location for understanding how statistics embodies a particular link between scientific and political authority. Statistics is located structurally in multiple fields – in politics, social sciences, natural sciences, public opinion research, etc. I think the reason it is difficult to understand statistics as a profession is partially because the way that professions have been defined based on a configuration of institutions that is culturally specific rather than universal, and also because statistics, as a profession, is linked so closely to the political rather than the economic sphere. It's not simply because of the way that government and the academy are related cross culturally, as Fourcade-Gourichas argues in her rejection of Abbott's theory of professions for comparative study, but because of the way that statistics also cuts across political and economic activity so differently from other professions or disciplines.

As a different unit of analysis, field theory provides a framework for understanding the simultaneous, rather than alternative, development of statistics as a profession and as a scientific discipline, as a discourse, and as a malleable tool that can be integrated into various institutional settings (Evans 2007; Featherman and Vinovskis 2001; Wagner and Wittrock 1990b). In fact, historians of science have demonstrated how the field of statistics developed piecemeal in a number of settings, shaping modern institutions and cultures rather profoundly (Desrosiéres

1998; Donnelly 1998; Gould 1996; Porter 1986; Porter 1992; Porter 1995; Wagner and Wittrock 1990a; Wagner and Wittrock 1990b). Linking those disparate developments with professional and disciplinary development in Japan requires a framework that can accommodate explanations of processes that are connected sometimes only indirectly across institutional boundaries through the discourse of statistical science.

Analytic framework

Statistics embody a way of seeing, a way of knowing. Statistics is a tool of the state. Statistics is a discipline, a profession. The theoretical challenge of this dissertation is to account for each of these conceptualizations of statistics in an explanation of the rise of statistics in modern Japan. Focusing on two periods of social transformation in Japan, I investigate two empirical questions: How did statisticians define their work intellectually in each period? With what strategies and in what organizational locations did statisticians institutionalize their specific forms of knowledge production? With these questions, I have tried to emphasize the process of developing statistical ideas themselves in particular contexts rather than treat statistics as a universally defined body of knowledge that develops universally in any social environment. I want to emphasize both the ways that ideas take shape within specific institutional settings and how they shape the development of institutions themselves. Moreover, this research makes explicit the ways that scientific knowledge interacts with both structure and cultural discourse at the national level. In sum, by narrowing my analysis to two time periods, I am able to demonstrate both the local specificity of statistical ideas themselves as well as the ways in which

statistical knowledge in its various forms was institutionalized as a broader, professional field of expertise that contributed to dramatic political transformation.

Explaining the social production of knowledge in this way requires attention to interactions among ideas, their social sources, and consequences. My analysis of statistics in two time periods is organized around two interactions in particular:

1) the creation of political discourse and its enactment in scientific discussion;
2) strategies of boundary work within and across institutional spheres.

As discussed above, this dissertation builds upon studies of science that emphasize the power of scientific discourse to affect social relations as a source of authority. My analysis of statistics in Japan approaches the interaction by first looking at the sources of political discourse and the ways that statisticians express them in debates about how they define their own work, and subsequently how political ideas become embedded alongside scientific ones in the institutions they build. Institutional development, moreover, is not a simple process of combining the best ideas and the strongest political force, but the historical outcome of opportunities created, strategies employed, constraints accepted or challenged, and possibilities explored or left unconsidered. The powerful link between scientific and political authority realized in Japanese statistical work is one such historical outcome.

In each of the following two empirical chapters, my analysis begins by explaining the highly unstable social and political climates of the Meiji/Taisho period (1868-1912/1912-1926) and the postwar Occupation (1945-1952). Chapter two is set during the time when elite intellectuals worked to solidify a new centralized state, and during which the structure of government and nature of citizenship were intensely debated. Chapter three is set in the immediate postwar years, under the American occupation when Japanese intellectuals,

politicians, and mid level bureaucrats attempted to redesign social, political, moral, and economic systems in a way that preserved some sense of national dignity while under the power of Americans with dramatically different cultural backgrounds. In each of these watershed periods, new ways of knowing, and those who embodied them, competed with established powers for a role in defining new social structures and relationships (Desrosiéres 1998; Starr 1982; Swidler 1986).

To demonstrate how these political climates shaped the development of statistics, I provide a brief account of the broad conceptual elements within each period's political discourse: westernization and modernization in the earlier period, versus democratization and transparency in the later period. These very broad elements provided a base for specifying meanings in particular contexts – in education policy, in economic administration, in the arts, in science (Camic and Xie 1994; Gamson and Modigliani 1989; Swidler 1986). Competition for political or cultural authority within any given social sphere consists partly of framing interests within that sphere in a way that resonates with the broader cultural discourse, making connections between the localized needs and aims with broader social forces. The success of competing discourses rests partly in the ability to make these connections in particular settings by reframing them in setting specific language or adapting only those portions of the broader discourse that fits (Camic 1995; Schweber 2006).

In the case of Japanese statisticians, general political discourses were specified in language that resonated with particular institutional aims in ministerial administrative agencies and academic settings in both periods, and also in the manufacturing sector in the later period. Taking seriously Shapin and Schaffer's claim that debates about ways of knowing are inherently political and potentially transformative (Shapin and Schaffer 1985), I examine the debates

around defining the meaning and scope of statistics in the Meiji period, and struggles over the appropriate application of various statistical methods to different social spheres in the postwar period, as discursive reflections and manifestations of struggles among political stakeholders.

In each chapter, I emphasize the ways that discourse is framed to be institutionally specific by analytically separating discussions of statistical work by institution, when in reality, institutional boundaries in the earlier period were quite fluid, and in the later period were crossed intentionally by elites who encouraged the development of a more general professional identity to counter institutional separatism. Analytically, however, the ways that broader, more general discourse was reframed to fit institutionally specific interests demonstrates the process by which the link between scientific and political authority was embedded in an institutional infrastructure that supported statistical work (Bourdieu 1991; Bourdieu 1993; Dobbin 1994; Fourcade-Gourichas 2000).

One of the major differences between the two periods of analysis is the degree to which statistics was recognizable as any sort of organized field, either by practitioners or those in related fields. In the Meiji period, statistics was introduced through foreign texts in translation by intellectuals who had studied in very different national settings. Just as statistical work would develop particular national characteristics in Japan, the texts that Meiji intellectuals translated were produced in very different national cultures and intellectual and political structures. As such, statistics meant different things in different places and the job of a statistician and his position within the structures of academies and administration varied. Japanese intellectuals debated the value of each of these different statistics while trying to integrate this new system of knowledge into their own emerging national structures.

By the time of the American Occupation, statistical work was recognizable in administration, and across the natural and social sciences as a body of knowledge and methods, if not as a particular discipline or profession. The structures of administration were already in place, and of necessity, were left relatively untouched by the American occupation officials (Dower 1999). But the infrastructure for statistical work had been dismantled during the war such that postwar reconstruction was first a matter of repopulating administrative agencies with statisticians, or those who could be trained as such. Given the devastated state of the economy, recruiting workers into government service and manufacturing took precedence over repopulating the universities, and the development of statistics as an applied science followed these broader social trends. Having already established some recognizable identity as a scientifically based specialization, however, some elite statisticians set to develop an infrastructure to support professionalization.

The difference between the two periods is important for understanding the strategies of boundary work used by statisticians for qualitatively different aims of institutionalization. In the Meiji period, for example, statisticians debated about whether statistics was a general method for all subjects of scientific analysis or a particular form of statecraft. In my analysis, drawing boundaries around the state and society as natural objects of statistical inquiry was an attempt to claim jurisdiction for statisticians by displacing traditional means of measuring feudal holdings by creating both the national entity and the appropriate means of measuring and evaluating it. The attempt was to create both the object of statistical inquiry and the institutionalized means to do so (Abbott 1988; Camic 1995; Desrosiéres 1998).

By contrast, elite statisticians in the postwar period did not have to struggle, for the most part, to justify the relevance of their work in state administration (exceptions such as the

resistance to statistical inference in the Ministry of Agriculture are discussed in detail in Chapter three). They did, however, struggle with each other over how best to institutionalize their work professionally. Institutional boundaries between academic (and political) work and administrative work were drawn and redrawn a number of times in response to both the political climate of the occupation, political aims of some statisticians, and the efforts to separate statistics from politics by others. In the latter case, some elite statisticians worked to weaken boundaries between subfields, particularly between mathematics and the rest of the field, as a way to increase the scientific authority of statistical work overall. This effort to strengthen the intellectual, or symbolic, boundary was coupled with the institutionalization of a professional organization that emphasized political neutrality by establishing scientific standards as the base of the profession. While my empirical analysis is not a Bourdieusian field analysis in any strict sense, his conceptualization of boundaries as temporary manifestations of struggles is apt for understanding how the different subfields related to each other across developing and changing institutional boundaries (Bourdieu 1990; Bourdieu 1991; Bourdieu 1993).

Understanding the state of development of the statistical field itself, I argue, is an important step in explaining how, with what means, and by what strategies, statisticians created and institutionalized a place for their work (Bourdieu 1975). In both periods, statisticians framed their work discursively as an essential component of governance, but the process of institutionalization was qualitatively different in each period. Meiji statisticians competed primarily with stakeholders of traditional political authority to gain a place at the center of governance on one front, and with discipline based, established scientists in the academy on another front. Postwar statisticians, by contrast, were appointed to positions of authority, and

employed both competitive and cooperative strategies to develop their work strategically across administrative, academic, and corporate boundaries.

Statistics as a link between scientific and political authority

This dissertation has been motivated first by the desire to bring the Japanese case to bear on the historical and sociological accounts of the transformation to quantitatively based governance. I argue that in addition to the substantive contribution, the Japanese case provides evidence for rethinking our frameworks for explaining the processes of professionalization and development of disciplines, how they might relate to one another in a broader field of expert activity, and how ideas, institutions, and national cultures interact.

In the two chapters that follow, I build on studies of the development of statistical ideas and infrastructures in the west (Desrosiéres 1998) to explain the development of Japanese statistics from the translation of a handful of foreign texts in the late 19th century to the authoritative knowledge of postwar reconstruction. Data for the analysis in Chapter two consists of a variety of primary material in Japanese, translated by the author, ranging from original publications of scholarly debates in the late nineteenth century compiled by the Central Statistics Bureau, government reports, and historical documents from professional associations and state agencies. I also draw on a rich secondary literature on intellectual developments of the period in Japanese, and on political developments in English.

The analysis of Chapter three is also based on a similar range of primary historical materials from government agencies and professional associations, but its foundation is a set of interview transcripts archived at the Japan Institute for Statistical Research at Hosei University.

The original, hand-written transcripts are the only written record of interviews of fifty-four individuals who were actively involved in the postwar reconstruction of the statistical system. Interviewees represented the vast range of institutional locations of postwar statistical work. My analysis is based on by own translation of a set of fourteen transcripts selected for the interviewees proximity to the central government. I also bring together scholarly studies heretofore separated by disciplinary boundaries of management studies, history, sociology, and Asian studies.

As in other places, but in earlier times, Japanese statisticians in the nineteenth century contributed to the solidification of disciplinary boundaries in both the natural and social sciences (Donnelly 1998), and the development of new modes of administration, expertise, and authority (Desrosiéres 1998; Foucault 1973). Many nineteenth century Japanese scientists, as in other places, believed that statistical research garnered a "new order of facts," by revealing laws and fundamental relationships (Donnelly 1998: 235-6), but what parts of the natural or social worlds were appropriate statistical subjects, how to use the new order of facts, and who should do the investigating, were very seriously debated issues. As Japanese elites turned to Western science for answers, statistical reasoning offered a new way of organizing knowledge that was both threatening and liberating.

In postwar Japan, a small group of social scientists, predominantly statisticians, was given a mandate to collect statistical data for the occupation and to rebuild the Japanese government administrative capacity. Many of the elite statisticians charged with rebuilding the system were deeply committed to socialist reform, believing that both statistics and socialism revealed the nature of Japanese capitalism in its true form (Hein 2004). Grasping political power, however, was not sufficient for transforming postwar statistics in to the authoritative knowledge

that it became. As my analysis of the broader field of statistical work will explain, the transformation also depended on intellectual developments in the field and the efforts to spread them as widely as possible. Counter to western accounts, however, expanding the field did not dilute statistical expertise, but rather strengthened it as a powerful combination of scientific and political authority in postwar reconstruction.

Chapter 2: Modern Science, Enlightened Governance

In late 19th century Japan, a number of scholars and scientists returned from abroad after years of studying western forms of governance, education, agricultural and industrial production, and all other things modern. Among the knowledge and skills of modernity that they introduced into Japanese life was statistical measurement, which they applied widely to scientific analyses and government administration. While many worked within their respective research specialties, a few committed individuals strove to institutionalize networks that would give them leverage within the state and academy as a professional community of experts. Efforts to institutionalize statistical work in government administration met resistance from those invested in the former power structure of military authority and close monitoring of subject populations. Similarly, efforts to institutionalize statistics as an entirely new academic science met resistance from those invested in established academic disciplines where statistics could be adopted as a new tool. The old and the new clashed in an era of political and social upheaval as Japan opened to the west and sought ways to prove itself as a modern, enlightened nation.

My analysis of original publications and organizational histories from the late 19th and early 20th centuries tells a story of statistics as a promising new field of intellectual work that challenged established ways of knowing and ways of governing (Asad 1994; Curtis 2001; Desrosiéres 1991; Desrosiéres 1998; Foucault 1979; Hacking 1982; Loveman 2001; Patriarca 1996; Porter 1986; Scott 1998; Woolf 1989). Where past rulers had relied on feudal lords to provide and piece together what was often incomplete and inconsistently collected information, the new centralizing state needed national rather than local, aggregate rather than individual, accurate and timely rather than incomplete and old, information. Statistical classification promised simplicity in assessing and managing the complexities of national production,

resources, and wealth by replacing long narrative accounts with data in discreet categories for tabulation, cross reference and evaluation. This new way of calculating, new way of defining the national entity, was not, of course, without its consequences for redistributing power within the ruling elite (Shapin and Schaffer 1985). Replacing the feudal accounting system of local measures, local surveillance, and local aggregation meant also replacing the social relationships that supported the system. While the Meiji restoration was in fact an attempt on the part of the elites to centralize the state under the emperor to avoid western colonization, many among the elite were feudal lords themselves, and thus were not committed to supporting the rise of a new class of intellectuals largely trained in the west, no matter how valuable their knowledge, to replace them selves in the new government.

As only a few were trained with skills to collect and analyze this newer kind of data accurately, to say that statisticians were a new class of intellectuals at the time of the Meiji restoration would be an overstatement. A large part of the social and intellectual culture of Meiji Japan, however, centered on westernization, such that wherever western scientific knowledge was introduced, it was paid close attention. While incorporating statistical knowledge into centralized, national governance was regarded enthusiastically for its potential as a useful tool, at the same time, it was also viewed, as were all things western, as a threat to traditional authority if taken too far. The challenge for those with statistical skills was thus to build support for their work within evolving institutions of power where more traditional elites still held considerable authority in determining how the new government would take shape. Meiji era statisticians thus tailored discourses and strategies for defining statistics as useful or valuable according to the perceived needs of various institutions, the different authority structures therein, and thus the different barriers to integration (Schweber 2006).

Chapter 2

The earliest years of statistical work in Japan were marked by debates among a burgeoning community of experts to define and redefine what statistical work was, where it was best developed, and to what practical and intellectual ends. Intellectually, the debates established multiple schools of thought around which theoretical concepts and methods could be pursued (Camic 1995). By demarcating variations of theoretical and applied statistical work appropriate to their established institutional locations (Schweber 2006), early statisticians provided practical ways of incorporating statistical science into existing power structures (Camic and Xie 1994). Some, however, went further in developing an infrastructure for independent statistical work. The development of independent research and training centers, and of social statistics as a discipline after the turn of the century, were responses by those who believed strongly that statistics was the modern science of enlightened governance, and who wanted to go further than simply integrating statistical knowledge into existing administrative structures. At one end of the spectrum were those who supported statistics being integrated into established and emerging government administrative agencies and scientific disciplines, and at the other end, those whose ideas of statistical science were intimately linked to ideas of social reform (Porter 2002), and who believed that the promise of statistics had been thwarted by those in power who protected older forms of authority to the detriment of science, sound governance, and the Japanese people.

Establishing statistics as a source of modern authority in Japan was, in practice, a process of institutionalizing statistical work in various spheres of knowledge production, led by a handful of well positioned, resourceful individuals armed with both scientific credentials and a vision for modern development (Bourdieu 1988; Bourdieu 1990; Campbell 2004; Frickel and Gross 2005; Porter 2002). My explanation of their efforts below is organized into three sections, each corresponding to analytically separable institutional spheres that in reality intersected and

overlapped considerably. In each section, I highlight the intellectual stakes of statisticians and aims for advancing their work, and the strategies by which they established institutional recognition within their respective subfields. I conclude by rejoining the three separate spheres into a complex field of statistical expertise that, by the end of the period, embodied considerable cultural authority as a whole, but quite uneven levels of social authority across subfields.

Objectivity and authority in state administration

At the beginning of the Meiji Era (1868-1912) government reformers sought to reorder the political and social landscape to thwart Western imperial efforts to colonize and control it politically, economically, and militarily. The first generation of reformers envisioned a Japan that maintained a rich cultural heritage within a technologically advanced society, borrowing heavily from western science. Statistical data collection, analysis, and publication within government administrative offices were some of the western practices that many officials believed could be incorporated into the new centralizing state. As a practical tool, it was used to realize the goals of government reorganization and function by creating an organizational foundation for collecting and analyzing "objective" and "rational" data to be used for policy creation and evaluation. As a symbolic tool, it functioned to establish the nation externally as a modern competitor on the world stage by proving to the west (and to the Japanese public) that the new administration prized scientific knowledge and that it was capable of modernizing government institutions. As such, it functioned to create a national image of modernity both externally and internally, and was supported to varying degrees by a number of intellectuals who moved fluidly between scientific and political circles (Porter 1986).

In an effort to unite the population under a central government and accurately measure the resources of the state, the very first central administrative act of the Meiji reform government was to establish a new household registration system. This initial introduction of centralized statistical data collection into administration proved difficult in the face of opposition from powerful warlords within the first generation of Meiji officials, whose authority had been maintained theretofore by locally based hierarchies. The Meiji household registration system fused old and new by incorporating systematic statistical tabulation into the registration practices of the Choshu clan of southwestern Japan (Cornell and Hayami 1986; Jannetta and Preston 1991). The Choshu household registers had been structured as a Confucian hierarchy with a ruling, male head, followed by his male elders and offspring in a stem family structure (Saito 1996; Saito 1998); female elders, spouses and offspring were enumerated as property (Ishii 1981). This model of household structure was imposed first on the aristocracy in the early Meiji period as the foundational unit of a reformed Japanese society, and spread quickly through active registration of all households by local officials (de Becker 1979; Osaka shi minsei i'in renmei (Minsei) 1988; Senda 1999).

The Meiji household register system was thus a combination of new ways of knowing and old ways of governing. Meiji household registers systematically measured the tax and manpower resources of the nation as a whole (although still divided by class), but did so within a system of administrative hierarchy that sustained the authority of military warlords within the central government (Aihara, Samejima, Ishikawa, and Isumi 1971). Regularly updated by monitoring and interviewing, the registers fulfilled a need for local officials to be able to exert some measure of social control while still providing data for national level analysis and policy development (Central Statistics Bureau 1972a). As a combination of new and old, the Meiji

register system set a precedent for other administrative programs to incorporate statistical work, which was done quickly in agriculture and commerce (Oya 1984b: 278).

The centrality of the Meiji registers in the new state structure also provided statisticians with recognition as skilled experts in modern scientific research. According to records, however, their tasks within administration were somewhat limited, to "making statistics of school expenditures"; "making statistics of births, deaths, and household populations"; "making statistics of bond and paper currency issuance" (Samejima 1971). Statistical experts were involved in planning data collection, which they argued was essential for ensuring accurate data. Their expertise was linked directly to the craft of creating classification tables, as then current scientific thought understood the organization of tables by categories to be an analytic method for discovering essential properties or causal relationships (Samejima 1971).

This conceptualization of statistical expertise was further institutionalized in 1872, when Itoh Hirobumi created the Office of Statistics in the Ministry of Finance (Itoh 2000; Samejima 1971). Itoh chose to name the Office "Toukeishi," over other translations from western languages that were debated among intellectuals at the time. Alternatives included seihyou (government table), which clearly identified the source of the numbers and the jurisdiction of the administration to collect and use them, and hyouki (classification table), which simply meant records or accounts classified in table form. The chosen term, toukei, carried the meaning of a table of items classified and recorded by their governing properties, which confirmed the affiliation between western scientific principles, their representation in statistical work, and the aim of the Japanese government to establish their practices as modern and scientific. In other words, it was one of the first steps to institutionalize the idea that classification revealed

fundamental relationships and essences of observed phenomenon against other interpretations of statistics.

Having gained some recognition for their expertise in analyzing data according to the believed properties of classification tables, statistical work within administration was increasingly more valued and incorporated into more departments. Among statisticians themselves, however, who moved easily between administrative and university positions throughout the Meiji period, the nature and scope of statistical work was a continuing intellectual debate. Tsuda Mamichi[1] argued for hyouki teikou (classification tables) as the appropriate translation for statistical work. It recognized the scientific method of classification, but connected it to the broader field of scientific research rather than confining it within administration (Samejima 1971). In Tsuda's understanding, quantitative data was the complement to experiments in the natural sciences that allowed for the identification of causal relationships and laws of society (Samejima 1971). He argued that if statistics could be appropriately used to record natural and Imperial House conditions, two areas that fell outside of current definitions of a "state science," then adopting the seihyou translation from German sources that equated statistical work with the science of the state in particular, was too narrow for Japanese conditions (Samejima 1971). Although Tsuda was a government official, his intellectual background emphasized politics rather than administration per se. He also favored scientific modernity broadly over narrower aims of administrative techniques. As was the case elsewhere, many Japanese intellectuals saw statistics as a widely applicable tool (Porter 1986).

The position against which Tsuda and others argued was drawn from German sciences, as mentioned above, and advocated the development of statistics as a discipline that was, by

[1] 1829-1904. Legal and political specialist of early Meiji, negotiator in Sino Japanese treaty; vice chair of the first house of counsillors (shugiin); one of first to study abroad before Meiji restoration, translated Dutch texts on sciences, including state/economy that translated into statistics.

definition, the social science of state administration (Samejima 1971: 5). Imai Takeo[2], a prefectural level official, represented this position, translating statistics as seihyougaku, or statistical state science. Imai argued that as a method, statistics refer to the rules of quantitative data collection and analysis, but if statistics is to be considered a discipline (and he thought it should), then it refers only to social science, or the scientific study of human society (Imai 1889). The relationship between method and discipline did not, he argued, suggest that the boundaries of any discipline necessarily be coterminous with the method of inquiry, but in the case of statistics, this was so (Imai 1889).[3]

Like Tsuda, Mori Rintaro and Kure Ayatoshi argued against statistics as only a discipline of state science. Mori was a medical scientist and government official who argued that scientists everywhere were rightfully incorporating statistical methods into research in many fields. In Mori's assessment, sciences as diverse as "medicine, law, literary studies, chemistry, economics and health, with their different specialties and purposes, are still all sciences" because they employ similar logics (Mori 1889). The logic of science brought these fields together, and it was mistaken, in Mori's view, to use a method used by all to define a separate discipline altogether (Mori 1889). Kure similarly argued that statistics was a scientific method to uncover the general laws and relationships of social phenomena (Kure 1882). Applying it specifically to administration, Kure argued that the effects of policies should be analyzed by making statistical observations before and after implementation to discover the reasons behind success or failure because of the way it illuminated essential relationships and causes (Kure 1882).

[2] Graduate of Kyouritu Toukei gakkou, employee of Tokyo prefectural and municipal governments, archive/records division 1877-1881; later worked with Okinawa residents association (minseikyoku) 1888-1893 and sutatisutikusu-sha 1888-1901.

[3] The argument that there was a unique relationship of method in social science (Imai 1889) resurfaces later in the development of the subdiscipline of social statistics

Tsuda, Mori, and Kure, each with different institutional interests and levels of government based authority, all argued for statistics to be incorporated into state administration as a method, rather than reforming administration to be something driven solely by the logic of classification. Where biologists and chemists had experiments, they argued, social scientists had statistics, and those who governed should be trained to use the tools of social scientists. Perhaps not surprisingly, this conceptualization of statistics gained more institutional support within a Meiji government that included powerful warlords who continued to exert authority based on social hierarchies rather than on scientific expertise. Though perhaps more conservative at first glance, this conceptualization also had transformative power to change the structural and intellectual organization of administration, albeit more gradually than Imai's ideas. Within a decade, the methodological conceptualization of statistics had spread across administrative units to the extent of developing into turf wars and problems of redundant data.

In 1877, officials from the increasingly powerful Ministry of Internal Affairs (Naimusho) established the Council on Government Statistics (Seihyoukaigi) as an overseeing organ to determine the jurisdictional split between what had developed as the two main statistical offices: the MOF Toukeiryou and the General Administration Bureau's (GB) Daiseikan Seihyouka (Itoh 2000: 33). The GB Daiseikan Seihyouka was given jurisdiction over the greater part of national statistics, while the MOF Toukeiryou maintained jurisdiction over collecting statistics relating specifically to money and grain, including domestic and foreign production, the rise and fall of commerce (prices), taxes, import and export. Following this separation of jurisdictions, the GB established statistical standardization across the five big Ministries of Foreign affairs, Homeland Affairs, Finance, Industry, and Justice in the same year. Thus granted the power to set standards as the organ of official knowledge production on the nation, the GB could claim considerable

authority for defining statistical work, at least within the administrative sphere. The MOF's Toukeiryo remained active, however, in generating statistical data on the economy, politics, and population, thus continually attracting as many experts as the GB's seihyoukan (Central Statistics Bureau 1972a: 105-107; Central Statistics Bureau 1972b: 95-97).

By the second generation of Meiji government, the household registers remained the only example of statistical work as the science of state. Having been routinized, the military authority on which the system was founded faded behind the rising authority of the systematic, centralized state. Still, the household register system stood apart from other administrative programs in that statistical work was not only the foundation of knowledge production but directly linked to hierarchical relationships of social control. Other programs lacked this direct link, instead using knowledge and the culture of objective scientific authority to generate policy that indirectly exerted power. In the same year that the Council on Government Statistics was created, an act that deepened the institutional structure of expertise, the enactment of a new Civil Code moved the household registers from the MOF to the Ministry of Justice (MOJ) (Samejima 1971; Sato 2002; Yabu'uchi 1995). This move established the registers as legal documents of status and identification, but stripped them of their enumerative function, essentially wiping out the institutional support for those who would make statistics the science of state rather than a more general scientific tool.

From the inception of household registration system in 1868 through the inaugural census in 1920, statistics gradually became the modern standard of knowledge production within government administration. Statistics brought scientific objectivity to governance, creating a new form of authority by coupling with the systematized central state. Institutionalizing this new authority within the state was a competitive process among intellectuals and officials who

advocated different roles for statistics. Those who believed that statistics was the science of state, started out strong with the bold new registration system. They separated themselves intellectually and institutionally from university-based scientists who argued that statistics was simply a method to be used by any science, but were eventually displaced by fellow experts who were willing to work under government authority for a time as they proved the value of their new kind of expertise. The claim that statistics was the modern science of the state was such a dramatic departure from older ways of governing that it was not surprisingly met with opposition in the early years of Meiji government when the old and new stood side by side.

Institutionalizing independence

In his study of the national census, Sato (Sato 2002: 9) characterizes the professional statistician of the Meiji/Taisho eras as someone who used the methods of statistical analysis to understand the nation, or people. After only one decade into the Meiji period, the profile of statistical expert indeed began to take shape from among those who "made statistics" in government administration rather than from those in the natural sciences. Statistician's authority for actively shaping policy or advancing science in universities was, however, still weak. Within both administrative and academic settings, statisticians were successfully integrating themselves into existing and expanding infrastructures, but were still constrained intellectually. Sugi Kouji[4] was one of many statisticians who moved in and out of government service, but stood out both in his capacity as an expert researcher and as an entrepreneur in developing statistics as an

[4] 1828-1918. Exposed to western science of statistics through translating Dutch periodicals at end of Tokugawa era. Appointed to Daiseikan in 1872 as head of statistics division, planned and implemented first modern pilot population census in 1880. Established Hyouki gakusha 1877, later Sutatisutikku-sha (and later Toukei gakusha from 1891). Also established Kyouritu toukei gakkou, 1884 while at Toukei'in.

independent field of expertise by creating institutions for training and research outside the government and university settings.

Sugi's personal intellectual leanings were towards statistics as a science in terms of its potential for answering fundamental questions by revealing general laws and properties of observed phenomena, particularly those of state and society (Sugi 1889). Publicly, however, Sugi concentrated his diplomatic and entrepreneurial skills on gaining support for statistical work in administration and recognition of statisticians as skilled experts more than as scientists per se (Campbell 2004; Frickel and Gross 2005). Sugi's first area of expertise was in population statistics. He worked to develop a national population census from the earliest Meiji years, but met resistance from those behind the registration system, as discussed above. Discontented with the limits of research in the administrative setting, Sugi left government work to found Hyouki gakusha, a group of seventeen statisticians that met on two Saturdays a month in a rented seminar room in Tokyo to present research and lectures for each other (Itoh 2000: 5, 42).[5] Membership grew, with students from public, private, and academic institutions, constituting the first face to face meetings of a new class of experts.

Sugi's school grew into the most influential site for training and research. He presented theoretical works in translation, and trained his students in the aims and methods of surveying and recording social data in tables (Samejima 1971; Sugi 1889; Sugi 1891). His courses included practicum studies in addition to statistical theory, history of statistics, methods, demography, econometrics (economic statistical science), social and political statistics, and moral statistics (Itoh 2000: 41). Sugi's lectures emphasized the role of statisticians in accurately recording social phenomena, and although he advocated a type of statistics that went beyond what the current

[5] Sugi was asked to join government service again in 1872, specifically to do the kind of survey work that he had proposed before, but even as he entered government service, he maintained and nurtured his private school.

Japanese government practiced, he did recognize administration and the social sciences as the primary creators and consumers of statistical knowledge (Sugi 1886; Sugi 1888; Sugi 1891). Nonetheless, he aimed to institutionalize statistical expertise as something beyond an administrative craft, which was reflected in the many transformations the school went through over the years and his efforts to establish professional societies that included statisticians from across academic, public, and private institutional boundaries (Itoh 2000). The 1900-1907 seminars organized by Sugi and his government colleagues trained 900 hundred students, graduating 800 from various institutional settings, further solidifying the status of statisticians as a recognizable class of experts.

Sugi's efforts to develop specialized institutions also highlights how Japanese governance and education systems together did not provide the necessary structural components for developing new sciences, despite the stated aims of Meiji officials to advance scientific research. Statistical work in universities was largely centered in the natural sciences where it functioned as a method within various disciplines. Similarly, where statistics was used in trade schools for applied research, it lacked a theoretical component (Baba and Arita 1960). University based statistics before the turn of the century, therefore, did not provide the intellectual justification for much of the applied work in administration, as is characteristic of university-administrative relationships (Abbott 1988; Fourcade-Gourichas 2000). Rather, Sugi's centers provided the intellectual and institutional bridges within a broader field of statistical work that appears to have also shaped future trends toward professionalization. Although Sugi's entrepreneurial strategies were path-breaking at the time, and certainly advanced the field overall, he was also constrained by the social and institutional structures and cultures of his time. Had Sugi or others had the opportunity to develop theoretical studies within universities rather than in centers linked so

closely to the government for training, statistics may have developed a stronger scientific foundation instead of a professional one (Wagner and Wittrock 1990b: 133).

The development of Sugi's schools was still anything but easy. He was forced to close many times over the years for lack of funding, and fought with government officials who protected their data when the schools had become large enough to compete over jurisdiction (Abbott 1988; Itoh 2000; Samejima 1971). Despite these challenges, Sugi's centers provided formal training, means of credentialing, institutionalized links to the state and among private, public, and academic constituencies, and status for practitioners as skilled professionals. In short, Sugi's efforts produced all the social and institutional criteria of established professional authority (Camic and Xie 1994; Frickel and Gross 2005; Frickel and Moore 2006; Gieryn 1999; Gieryn 1983; Lamont 2001; Nullmeier 2005; Turner 2007). Through his centers and the networks that they supported, statisticians of various institutional and disciplinary homes rose in social status as skilled scientific experts (Porter 1986). Combining theoretical studies with close links to both academic science and administration, Sugi and his supporters transformed statistics from a promising new form of intellectual work into an authoritative form of knowledge positioned solidly within a constellation of modern institutional powers (Abbott 1988; Fourcade-Gourichas 2000; Gieryn 1999; Starr 1982; Starr 1987).

Social statistics as a quest for intellectual independence

By the turn of the 20th century, the rapid social change of Meiji society had spawned and range of intellectual and political critiques, from nativist or imperialist, to materialist (Barshay 2004). Having worked to secure their position within governing structures, many statisticians

were involved in the production of official knowledge that supported nascent imperialist policies. Within the academy, however, a critical science of social statistics developed as a combination of nativist and materialist schools of thought. Takano Iwasaburo[6] of Tokyo Imperial University articulated most powerfully the tenets of social statistics – that statistics was the method of social science, and that social science should be the foundation of governance. His agenda recalls efforts of first generation Meiji intellectuals who argued that statistics was the science of state, intellectuals who were positioned to influence the structural and ideological development of modern authority and governance, but who were up against institutionalized power of a different nature. Takano's arguments were similarly an effort to establish statistics as the link between modern scientific knowledge and enlightened government, but different from past arguments in their origin in academic theory rather than the practice of governing.

The difference in generation is important. First generation Meiji statisticians faced feudal lords as competitors for a position within decision making circles. Introducing statistical methods for them meant introducing a new source of authority, one based in modern science rather than in military strength and traditional social hierarchies. To be sure, intellectuals in both early Meiji and late Taisho/early Showa moved much more fluidly in Japan than what we might expect in contemporary social life, but different from his predecessors, Takano's cultural authority came clearly from his position in the university system. Takano's generation thus faced fellow intellectuals, rather than officials, as competitors for cultural, or symbolic authority. As early statisticians did, those in Takano's generation commented frequently on political developments, which ranged from the uneasy development of Japanese constitutional democracy, to Japan's

[6] 1872-1950. Tokyo University Professor in 1904, faculty of Law, specialty in Statistics and Economics. 1910 appointed as head administrator of Cabinet Statistics Bureau, worked on census. 1920-23, vice president of Tokyo Statistics Association; retired before World War II, relocated to leftist Ohara Institute for the Study of Social Problems.

place in the world after winning two wars against western powers, to the social problems associated with rapid industrialization and the structure of Japanese capitalism. As was the case with scientists in other times and places, Takano's scientific ideas were often married to his political ones (Barshay 2004; Porter 2002; Porter 1986; Shapin and Schaffer 1985)

Takano's home base was at Tokyo Imperial University, where he began teaching statistics in 1903. He was the first Japanese professor to teach statistics, adding to courses taught at private schools by foreign visitors (Keio University, Waseda, Meiji, Senshu, Chou, Ritsumeikan and Tokyo Commercial High School) (Baba and Arita 1960). Takano's work, unlike the applied methodologies and limited theory in translation at other schools, focused clearly on developing a politically engaged, theoretical foundation for a nativist school of social science, with statistical reasoning at its core. Statistics as the method of social science, in Takano's account, was akin to the tools of biology, but with a more profound affect:

> Let us use microbiology as an example, where a scientist can use a microscope to get a very elaborate observation and do experiments, but a less experienced scientist with less elaborate tools would not garner as good results as the former. The difference is even more pronounced with social sciences, since the observer/scientist brings his own psychological realities and interests to the "experiment" or observation, thus influencing the results. What we have done over the years is to record various observations and attempted to standardize methods (or at least calculate differences). This is what the science of statistics is, and how it has been developed, by developing and institutionalizing methods by which to eliminate bias of interested observation. So by nature, the science of statistics is THE social scientific method because it accounts for observations that are inherently influenced by social interaction. (Takano 1919: 130)

Quantitative study of social and natural life through statistical research could establish general laws and causes of observed phenomena, and, according to Takano, was the foundation of a scientific discipline in which object and method had a special relationship. The discipline, he argued, was still in development, and would amass the kind of data and analyses over time that would make clearer its independence from other disciplines, just as the accumulation of research results had done in the natural sciences, where phenomena that were more easily observed, recorded, and measured quantitatively allowed for faster disciplinary development (Takano 1919: 129). The idea that statistical work revealed causal relationships and essential properties of observed phenomena was not new, but Takano's theorization of disciplinary development made a new connection between quantitative work and an industrial present in which Japanese intellectuals searched for both philosophical and social evidence of Japanese development (Barshay 2004). This link was essential for establishing the legitimacy of social statistics as a discipline within the academy and as a broader political discourse.

In his broadest statements, Takano argued that the human ability to reason in numbers related to the development of civilization; just as the ability differs between children and adults, so too does the ability differ between primitive and civilized men (Takano 1919: 129). Statistics offered an alternative formulation of human development, akin to those, Takano argued, of ethics, education, biology, and sociology (Takano 1919: 129). Another academic, Ninagawa Torazo justified his approach to social statistics as emancipatory work to analyze the creation of official statistical knowledge as a social process, aiming to uncover the contradictions and power abuses of the imperialist government (Oya 1990: 10). Ninagawa argued that even processes of alienation were evinced in the development of both content and procedure in agricultural and commerce statistics (Oya 1984b: 280). For critical social statisticians, statistical work in the hands of the

state lacked integrity and served only those in power rather than the Japanese public (Oya 1984a: 180-81). Their approach, they claimed, returned statistics to its nature as a method of discovery, and could provide answers to the ever more complex relations of modern industrial society.

While Takano and Ninagawa asserted the organic development of social statistics as an emancipatory discipline, fellow academics like Fujimoto Koutaro[7] (Fujimoto 1915) maintained that statistics was a widely applicable method, but not a science in and of itself. Fujimoto was particularly wary of defining statistics as co-terminus with any disciplinary boundaries. Social statistics, he argued, was simply a constellation of moral, education, economic and political statistics, and was a field of scholarly inquiry where statistical knowledge is the center, but not a discipline in and of itself (Fujimoto 1915). In contrast to the argument that the discipline of social statistics was an organic intellectual and social development, Fujimoto emphasized the development of method, and argued that it was indebted to population statistics, economic statistics, and political statistics as the only sources that made the social statistician's object visible (Fujimoto 1915: 126).

Takano's idea of a discipline was critical of the idea that making an object visible was an end to social science, in favor of emphasizing the discovery of essential properties and causal relationships:

> Statistics are the results of observations in numeric form, but not the original thing that was observed, although our use of statistics (relating them to other statistics, finding averages, comparing, calculating, etc.) creates real things, not just rates, but a

[7] 1881-1968. Ph.D. Professor at Tokyo School of Commerce (Tokyo Kudo Shougyou Gakkou, now Hitosubashi University), specialty: Insurance studies, Statistics. Toukeigakusha council member from 1920, later vice president/president from 1930-1940. Merged Tokyo Statistical Association and Tokei gakusha in to Greater Japan Statistical Society (now JSS) in 1945, vice president, 1947-1968.

> "household" that means "the ideal" which may not have been observed. (Takano 1912: 108) (lecture given to the Tokyo toukei kyokai at the annual conference)

Much of statistical work in since the beginning of Meiji fell short of what Takano considered to be its potential. Pointing to influential studies of death, conception, birth, and other areas that had been conceptualized as purely natural phenomena, Takano highlighted how social statisticians were able to explain these phenomena through measurements of social factors such as occupation, diet, marital status and economic resources, factors that were shaped by Japan's position as a late developing capitalist nation.

As mentioned above, Takano took his expertise as a social scientist even further (as many intellectuals of the period did), connecting social statistics with broader political discussions such as the development of parliamentary democracy. He argued for rational and open governance, and asserted that statistical data and analysis had a special role to play in making that a reality because a constitutional democracy must entail an informed public. Takano's statement on the need to develop Japanese statistics beyond simply establishing offices in government ministries, for example, tied together scientific consciousness, statistics, constitutional government, and labor relations:

> Japanese statistics seem on the surface to be advanced, given their strong institutionalization in administration. The Cabinet Statistics Bureau, the Home Ministry and the Ministries of Finance each have dedicated professional statistical staffs and publish statistical research regularly. This, however, is only the formal layer, and in reality, Japanese statistics lags behind European systems. In order to advance the statistical system, a number of things need to be improved. Foremost, we need to develop a scientific consciousness where social phenomena can be analyzed objectively. Secondly,

> we need to establish a constitutional government because the demands of both government and citizens for accurate information is inherent in constitutional government. Thirdly, we need to advance economics in general so that individuals recognize their real positions within a complex economic system and can evaluate how to harmonize their own positions with those of other classes (understand what needs to be done for economic equity/harmony). (Takano 1913: 111-113)

In terms of how to do this concretely, statistical data collection, analysis and dissemination were essential, and thus the statistician was invaluable. Expert statisticians, her argued, not police, were needed to collect data (Takano 1913: 116-118), and more were always needed to staff different areas of government administration (Takano 1913: 118-119).

Like the efforts to establish statistics as the science of the state, Takano's indigenous discipline of social statistics sought to advance both science and government by incorporating statistics at their foundations. Social statisticians clearly sought to establish their work as essential for both the academy and government, but their ideological position of an organically evolved, revolutionary social science differed greatly from past conceptualizations of statistics as the tool or science of statecraft. Claiming intellectual justification for their ability to explain contemporary social issues ranging from changing agricultural and industrial relations to Japan's place in the world, they tried to gain recognition for their work as profoundly social, and public. This approach differed from efforts to create a discipline of statistics justified by purely scientific merit, or by its work as an applied scientific method. Rather, the social statistician in early 20th century Japan presented his work as the culmination of efforts to link modern science to enlightened government. The complexity of society, of the academy, of administration and

politics, had advanced far beyond what the early Meiji reformers had faced, and Takano argued that social statisticians were particularly qualified to make sense of it all.

The first generations of Japanese social statisticians were not successful in establishing their discipline as either the core of social science or of governance (their rise to power in the postwar period is discussed in the following chapter). What they did accomplish was to establish the intellectual and institutional foundations of a new subfield of statistics that gives the Japanese case its peculiar balance of politically charged, materialist critique and routinized administrative authority. In the west, Desroisieres argues that "the history of the successive retranslations of the word 'statistics,' in itself furnishes a summary of the act of separating the (political) management of people from the (scientific) management of things – this separation leading to the autonomy of the various fields of knowledge" (Desrosiéres 1991: 200). I would argue that the development of social statistics in Japan was an attempt to reclaim statistics politically as emancipatory knowledge, engaging political authority through scientific knowledge in a way that has not happened in the west.

Conclusions

For the early Meiji reformers, modernizing Japan meant integrating western knowledge into all aspects of social and political life while preserving the integrity of Japanese culture. Statistical knowledge in particular was central to the modernization of administrative programs and the development of scientific disciplines, both of which were processes that spanned generations. While the value of statistical classification was well recognized, the first generations of Meiji reformers were more prone to integrate statistical work into existing programs than to

create new ones altogether that might overemphasize the importance of statistical expertise. Interested rather in preserving more traditional forms of authority, officials incorporated statistics into a register program that relied on surveillance, monitoring, and hierarchical chains of command to implement. Even in academic spheres, efforts to establish statistical science as a new, independent discipline were thwarted by scientists who used statistical methods to advance research agendas but who denied claims that it constituted a new discipline altogether.

Similarly to disciplinary or more general field development elsewhere, Japanese statistics grew from a number of different institutional locations as individual scientists applied statistical methods to diverse objects of study (Desrosiéres 1991; Desrosiéres 1998; Porter 1986; Porter 1995; Schweber 2006). Early Meiji statisticians began in a position of institutional weakness, without deep support from either the state or scientific community. Yet, challenging those who claimed that statistics was the modern science of state, a few, well-positioned, entrepreneurial men capitalized on the more acceptable aims of integrating statistical science into established structures (Abbott 1988; Campbell 2004; Frickel and Gross 2005; Sato 2002). Focused on the development of theory and methods, and the generation of data and analyses, a burgeoning class of experts formed outside of government who linked objective analyses of statistics to enlightened governance. Their skills were demanded by government, upon which most of them still depended for their livelihoods. As they contributed to the development of a professional community of experts, their research also reinforced the emerging boundaries among the specialized subfields they represented (Abbott 1988; Camic and Xie 1994; Porter 1986; Ross 2003). The early development of statistical science in Japan was thus constrained politically by its position outside the center of power but became more powerful with generational change, gradually shifting the intellectual and institutional support from old ways of knowing and

governing to new (Bourdieu 1985; Bourdieu 1990; Bourdieu and Wacquant 1992; Desrosiéres 1998; Foucault 1973; Scott 1998).

Combining the cultural authority of statistical knowledge in to social power was a process of institutionalizing the production and use of that knowledge within structures of power. Intellectually, statistical classification promised nothing less than new understandings of natural and social phenomena in science and a foundation for enlightened governance based on its capacity to rationalize complexity (Desrosiéres 1998; Hacking 1986; Larson 1984; Porter 1992; Porter 1995; Starr 1987; Weber 1978 (1951); Winther 2008; Woolf 1989). Institutionalized in programs of state administration, statistical classification transformed government authority from that solely based on traditional hierarchies and military force to one based on the scientific analysis of national resources for policy planning and modern development. The transformation of authority was gradual, and accomplished by those who worked to incorporate statistics into government procedures rather than those who attempted to establish new ways of governing outright.

In the academy, statistical classification certainly advanced research in the natural sciences, but its affect on the social sciences was transformative. Statistical science laid the foundation for the development of a materialist social science that combined social critique with scientific analysis, which differs greatly from disciplinary development in the west. Although scientific and political ideas are recognizably joined in the development of statistics elsewhere, western academic statistics eventually solidified around mathematics (Desrosiéres 1998; Porter 2002; Porter 1986), but the materialist character of Japanese social statistics embodies the particular position of Japan as a latecomer to the international capitalist system. Social statisticians established themselves within the university and in public arenas as activist

intellectuals, reclaiming statistics as knowledge produced for the people and the advancement of society. Their public agenda reached from data collection and analysis of industry, labor, agriculture, education and health to establishing parliamentary government. Their intellectual agenda was to establish an indigenous discipline of social statistics that located Japan's development within world wide industrialization and legitimized political reform. Combining the power of the academy with popular support, social statisticians established themselves as intellectual leaders in social and political reform. Their rise to central power in the postwar government is the subject of the next chapter.

Chapter 3: Rebuilding Statistics, Rebuilding Japan

As Japan became more entrenched in Imperial expansion, professional autonomy achieved in the 1920s and 30s in many areas of science was threatened by an increasingly closed circle of government officials. Those in power during the Imperial period sought to control the production and dissemination of all knowledge pertaining to the wealth, prosperity, and military strength of the Japanese Empire. A special wartime administration order cut operations budgets for all official statistical enterprises and placed all reporting of social and economic conditions under strict secrecy controls (Hein 2004; Iochi, interview). Statisticians in government lost what independence they had established to pursue scientific studies of their own design, and statistical committees and offices were shut down (Shimizu 2000: 272). By the height of the war, most government statisticians had been replaced by regular administrative employees and many university based statisticians had been purged or had left voluntarily after publishing analyses critical of Imperial policies (Hein 2003: 768). The relatively autonomous profession of statistical expertise was essentially dismantled during the war in favor of knowledge production geared explicitly at legitimizing Imperial aims.

Japanese statistical expertise was reborn during the immediate postwar years. Handpicked by occupation officials for their reputations as both statisticians and skilled social scientists, postwar Japanese elite statisticians were given an unprecedented amount of political power to rebuild the statistical system. As in other places in times of war or postwar reconstruction, the statistician's network expanded immensely, linking scientific, administrative, and political institutions through a shared need for the statistician's particular form of knowledge (Desrosiéres 1998: 156-7). In the minds of both the Americans and Japanese, a sound statistical

system was a fundamental part of democratic governance. In ideological terms, elite statisticians argued that statistical knowledge revealed the true nature of Japanese capitalism and that its dissemination enabled the Japanese people to hold their government accountable (Hein 2004). Postwar statisticians thus welcomed the opportunity to rebuild the system under the Occupation in hopes of also achieving their broader ideological goals.

The practical goal of postwar statisticians was independence – independence from the Americans, and independence as a profession. Though they had little control over the former, they exploited their connection to the center of political power under the occupation to achieve the latter. Empirically, this chapter explains the development of a complex, multi-institutional field of statistical work, rather than simply a profession. Building from the ideas of transparent, democratic governance or from the leftist idea that statistical science and socialism were naturally paired, statisticians worked to institutionalize their work in various administrative agencies, academic sciences, and in economic production. They met resistance along many paths. While elite statisticians had the resources and support to develop broad professional networks and an infrastructure for administrative statistical careers, individual statisticians could be fairly isolated, struggling to convince their peers and superiors of the value of statistics over other, more traditional managerial practices. My analysis below attempts to bring out how statistics became the authoritative knowledge of reconstruction not only as the result of intentional efforts to realize ideological and professional goals but also as the result of isolated struggles over work and unexpected opportunities to expand statistical work.

The theoretical work of this chapter is to demonstrate the analytic strength of synthesizing separate literatures on discourse and culture, the professions, and scientific knowledge. I proceed in three parts. The first section is dedicated to explaining the creation of a

discursive link between statistical science and good government. The link is important in two aspects. First, it is important because it provided the discursive "tool kit" (Swidler 1986) with which statisticians justified their work and their efforts to expand their field. Secondly, it is important because it illuminates the particular political structure in which postwar statistical science was embedded (Bourdieu 1988; Bourdieu 1990; Bourdieu 1993). During the occupation, statisticians worked closely with occupation officials, mostly to provide information, but also to develop policy. The relationship was beneficial for both sides. Statisticians lent scientific authority and perceived objectivity to policy, and the Americans lent considerable political authority to a group of statisticians that would have otherwise been much further from the center of power. The story of the first section is thus about power – where it came from, to whom it was granted, and how it manifested in a particular discourse that joined scientific and political authority in a way that defined statistical knowledge as the intellectual tool for democratic reconstruction.

In the second section, I approach postwar statistics from a different angle. Using personal testimonies and administrative histories, I document major institutional developments to demonstrate how boundary work along very different paths successfully solidified a decades long effort to create a sub discipline of social statistics as well as a professional practice based on scientific standards (Bourdieu 1988; Bourdieu 1990; Bourdieu 1993; Camic and Xie 1994; Gieryn 1999; Gieryn 1983; Lamont 2001; Wagner and Wittrock 1990a). In line with their intellectual commitments to socialism, leading social statisticians such as Takahashi and Ouchi concentrated on the subject of administrative research and the grander structure of postwar statistics. Tensions with the Americans and more conservative politicians eventually pushed them out of central power, but not before they had set strong institutional foundations for

statistical work as the center of postwar development. Turning to the work of Morita Yuzo, the head of the Central Statistics Bureau and the youngest member of the elite, central committee, I also focus on the development of statistical science as an autonomous profession. Morita's efforts concentrated on creating a culture of professionalism within administration by defining the statistician's work as basic research rather than evaluation, by replacing traditional hierarchies with scientific authority and horizontal relationships through professional associations.

In the third section, I bring together the different elements of discourse, institutionalization, power, and intellectual developments in the field to compare two substantive areas of postwar statistics. Agricultural and industrial statistics could not have been more different in their relationship to central power, the demographics of practitioners, or the degree to which they embraced new statistical science as a useful tool. The comparison emphasizes particularly the way that local work settings contribute to the development of statistical ideas and methods, even as they are linked by broader networks of professional and scientific standards (Camic 1995; Camic and Xie 1994). The comparison also highlights differences in strategies used to establish statistics as authoritative knowledge across institutions.

Linking scientific and political authority through new cultural discourses

Postwar Japan was "a ruined world" (Dower 1999: 25). Total defeat of the Imperial administration left Japanese political, economic, and cultural structures in disarray. In this extremely unsettled environment, American occupiers claimed political authority based on military strength according to the Postdam Declaration. General MacAurthur was as the

"Supreme Commander for the Allied Powers" and granted him immediate power over all land, sea and air forces, and subjected the Emperor and government of Japan to his rule. He was encouraged to administer through the Japanese government , but was also given an army division for enforcing SCAP policy, which he dispersed in major industrial cities for surveillance (SCAP General Staff 1994 [1943-1953]: 68-69). Knowledge and information was thus gathered by the army division by observation, by transitory inspections by SCAP staff, and by data generated by both SCAP division staff and the corresponding Japanese ministerial agencies, but also by national scale surveillance agencies: Counter Intelligence, Censorship, Public Safety, the Military Police and local Provost Marshal, many of which employed enlisted Japanese Americans in the United States Army brought to Japan for specifically this purpose (SCAP General Staff 1994 [1943-1953]: 73). Thus although the broad aims of the Occupation were to guide Japan through reconstruction and nurture democratic reform, it did so through very authoritarian means. In addition to criticisms of General MacAurthur's authoritarian rule, many have noted how changes in occupation policy after the first two years that reflected a conservative turn in American domestic politics strained relationships between SCAP and the Japanese administration considerably (Dower 1999; Hein 2003; Hein 2004; Nishimura 2009).

While changes in policy at the practical administrative level were challenging, the postwar mantra of "Peace and Democracy" as a discursive tool for organizing support of occupation policies seemed to accommodate even the most dramatic changes. Like other cultural discourses, it could be redefined according to the needs of different social sectors (Gamson and Modigliani 1989; Swidler 1986), and even shifts in American domestic policy on which it was based. Within the Economic and Sciences Division of SCAP and related agencies (including their Japanese counterparts), it was operationalized as legitimization for using statistics over

other methods to generate and evaluate data on all aspects of Japanese social and economic life. Arguing that statistics offered an objective and transparent form of knowledge production, Japanese social scientists working with SCAP staff used the discursive link between statistics and democratic government to justify the mass recruitment and training of statisticians, the creation of standardized surveys, and the reconstruction of a complex statistical infrastructure. While their efforts were certainly self interested, the success of Japanese statisticians in achieving their aims was partially the result of their strategic employment of reform discourse to frame their work accordingly.

Much of the discourse linking statistics specifically with democratic government was generated by Stuart Rice, the American sociologist and statistician who led a delegation under the occupation charged with evaluating the state of the statistical system (Rice 1946: 16). Rice's delegation was one of many groups of experts sent to Japan to evaluate and report on progress in different sectors. Organized by the various staff sections of SCAP, which corresponded to Japanese ministerial divisions, expert delegations were mobilized for health and welfare, education, naval operations, tax reform, banking, statistics, and economic production, among others (Nishimura 2009; SCAP General Staff 1994 [1943-1953]: 72-82). In his work with the Japanese committee and in his written reports on reconstructing the statistical system, Rice provided a strong rhetoric that fused together statistical knowledge with democratic governance that was the ultimate aim of occupation reform. Rice argued that not only did Japan need reliable statistics for its own governance, but that it was in America's and the world's interest to rebuild the statistical system to ensure peaceful development and international relations:

> Realistic appraisals of national position and interests, leading to cooperative attempts to reduce the stresses and strains in the world fabric, may replace speculative ventures in

> military aggression. To such peaceful solutions the United States is committed….In the complex modern world no nation can order its affairs efficiently, with avoidance of economic unbalances and social conflicts, without an abundance of timely and accurate statistical information. It is therefore essential to American policy that it assist in the development within Japan of a statistical organization that will be competent to supply the government and people of that nation with a continuing flow of statistical information adopted to their needs (Rice 1946: 6)

Development of an efficient, democratic social order, Rice argued, would enable Japan "to live in peaceful and friendly relations with our own and other nations" (Rice 1946: 6). This conceptualization provided the discursive support for statisticians' efforts to expand their field and recruit new workers in a climate of intense competition among agencies to establish themselves at the center of postwar government structures.

American enthusiasm for statistics as an objective tool of government worked advantageously for the social scientists who found themselves closer to the center of political power after the war than they imagined was possible during it (Barshay 2004; Hein 2003; Hein 2004). Many of the Japanese elite had been exiled during the war for their critique of Imperial policy and manipulation of administrative knowledge. Those furthest left on the political spectrum came from an intellectual tradition that put statistics together with socialism as systems that revealed the true nature of Japanese capitalism (Hein 2004). Regardless of their place on an ideological spectrum, however, members of the elite committee for the reconstruction of the statistical system agreed that Japanese government should be rebuilt as transparent agencies in which policy could be developed based on objective research. They believed strongly that statistics had a special role to play in achieving that aim. To that end, they had been planning the

reconstruction of the official statistical system in exile, and were ready to set to work when they gained the position and resources to do so under the occupation.

For both parties, professional integrity was a necessary element to producing sound statistics. Both sides agreed on the importance of rigorous standards and professional autonomy. In planning the new system, Rice encouraged Japanese statisticians and officials to institutionalize particular ranks of statistical experts who worked within administration as the highest grade of civil service as a way to institutionalize scientific authority within government structures (Rice 1946: 4). Outside administration, Rice also encouraged the development of university departments, professional societies, and training institutes as a way to sustain professional autonomy (Rice 1946: 24). Rice's support for developing a professional infrastructure as a necessary element of producing sound government information provided further justification for statisticians' efforts to claim administrative budget allocations, as well as some level of security for remaining close to central SCAP operations.

While the aims of building an autonomous profession and a special place for statistical knowledge in government were shared between the Americans and the Japanese, Rice's rhetoric of reconstruction also made explicit connections between statistics and American rule. Knowing that their physical presence and ability "to police the collection of current data" (Rice 1946: 5) would diminish over time, Rice emphasized the need for a well-organized Japanese statistical system to enable American rule from afar. "With little exaggeration," he wrote, "it can be said that the occupation during its latter phases must govern Japan by means of Japanese statistics. It will require these as bases for the formulation of its directives, for appraisals of the effects of its directives, and for knowledge of the manner in which its directives are being carried out" (Rice 1946: 5).

Though the Americans, of necessity, retained much of the structure of government agencies, they tried, where possible, to replace staff. They drew from universities and business, in addition to administrators who had been exiled during the war for their critique of Imperial policy. They handpicked a group of predominantly social scientists as the central committee to oversee the generation of data and to plan how to rebuild the statistical system, and granted the committee power to bestow administrative guidelines and decisions. In so doing, they endowed political power to a group of scholars with a decades-long history of social critique. Since the early 20th century, the work of social statisticians concentrated on economic analyses of Japanese capitalist development using statistics. Their broadest political aims were to guide Japanese capitalism through to socialist revolution, although of course the level to which any particular scholar was committed to political action varied widely.

Despite the tensions that arose from the way that Rice connected continued American rule through statistics, Japanese statisticians capitalized on the discourse that linked statistical knowledge to democratic reconstruction of their own government. Having made the link between statistical knowledge and democratic governance, and having selected a number of left-wing social scientists to lead the Japanese team, the development of postwar statistics was therefore always steeped in politics rather than an exercise in objectivity and transparency, as the discourse suggested. As others have shown in different cases, the strength of broader discourses is often found in the ways they can be manipulated and redefined to fit particular situations, or even absorb contradictions between ideals and practice (Gamson and Modigliani 1989; Loveman 2001; Swidler 1986). Certainly for the Americans, democratic reform as a goal did not match what was done in practice. Japanese statisticians also used employed the discourse of democracy and transparent government strategically to position them selves strategically for potential

political gain after the occupation and to support professionalization projects that required mobilization of government resources.

Institutionalizing democracy, building a field

In addition to overseeing data generation for the occupation authorities, the committee for the reconstruction of the statistical system was charged with rebuilding a statistical system that would meet the requirements of democratic governance, as defined by the occupation. Rebuilding the statistical system included everything from training new recruits and repopulating administrative agencies to writing laws establishing national survey schedules, from building the infrastructure of central and regional offices to standardizing methods and categories across agencies. How best to achieve theses goals was hotly debated as new and old institutional structures clashed and new sources of authority sought to displace traditional ones within circles of Japanese administrators and intellectuals. At stake was the shape of Japanese democracy, defined partly against the abuses of government control during the imperial period, and partly by American ideas of freedoms and the accessibility and accountability of government. For the small group of Japanese social scientists charged with designing and creating the statistical infrastructure, at stake was their place within the center of government administration.

Two prominent committee members, Ouchi and Takahashi, brought a long history of social scientific critique to the work of the committee. Their broader ideological commitments were to guide Japanese capitalism through toward socialism – a more leftist formulation of the discourse on statistical knowledge as the tool of democracy. Their daily reality, however, was governed by more practical demands for massive amounts of data and pressure from Occupation

authorities to make progress on infrastructural development – all this while being deeply involved in the politics of the occupation.

For Ouchi's part, he saw his advantage outside the innermost circles of administration. Having refused a ministerial post in economic affairs, other senior statisticians and advisors convinced Prime Minister Yoshida to grant Ouchi the independence to rebuild the statistical system from outside the government (Takahashi, interview). With resources from the government, Ouchi founded the Japan Institute for Statistics Research (JRSI). The institute served both as a back up for the Central Statistics Bureau and as the headquarters for infrastructure planning (Morita, interview: 50; Takahashi, interview: 46). With Ouchi as the Director, the institute drew researchers more interested in Marxian or socialist analysis than in serving the Occupation, which set up antagonisms between staff and administration at first (Nagayama, interview; Takahashi, interview). But Ouchi emphasized more practical research and training, including public opinion surveys as a source of important information on public opinion that he believed to be a vehicle for developing democratic consciousness (Hein 2003). Ultimately, the Institute was the site at which the critical, left-wing sub-discipline of social statistics was institutionalized and flourished, but during the occupation, it balanced critical research with practical contributions to government administration in particular and economic planning in general.

As chair of the committee, Ouchi did leave his mark on the structure of the system as a whole. Hein (Hein 2003) explains how postwar centralization was motivated by the particular ideological assumptions of the leftists. Not only did Ouchi argue that centralizing statistical work under the elected prime minister's office would institutionalize protection from the undemocratic decision making inside the various ministries, but centralization also allowed greater planning as

a vehicle for social redistribution. As in other examples, Japanese statisticians brought their own ideas about democracy (or socialism), and the role of statistics within it, to bear on infrastructural planning. Complementing his plans for centralizing statistics to counter ministerial interests, Ouchi also made efforts to counter the privilege of administrative statistics and the superiority of government-based data by building nongovernmental capacities for data gathering and analysis. In addition to the Institute that he headed, Ouchi and his close colleagues institutionalized statistical planning within the main business federation, the Ohara Institute for Research into Social Problems, and within labor unions (Hein 2003: 771-2).

At the institutional level, Ouchi also had some impact on the culture of administrative statistics, despite his institutional separation at the Institute. Having drawn from his personal academic networks to repopulate administrative offices as chair of the reconstruction committee, on the job training changed dramatically from what it had been during the preceding Imperial period. In addition to learning survey design and sampling theory, new recruits under former academicians translated theory, from Marx to Keynes, in seminar-style reading groups, and were introduced to academic and professional associations (Nagayama, interview: 4-6).

Takahashi worked directly under GHQ (Economic Science Bureau Keizai kagaku kyoku) as a translator and facilitator between the Americans and various agencies and organs, including the statistical committee (Takahashi, interview: 37). As such, his role in rebuilding the system was in negotiating compromise between American and Japanese expectations. Takahashi, was, as many colleagues on the committee, a social statistician with deep socialist convictions who had been pushed out of university work during the war (Takahashi, interview: 25-26). He was also a committed statistician, and enjoyed a very close personal and professional relationship with Stuart Rice that was sometimes even criticized by his Japanese colleagues as too close

(Takahashi 1981, interview: 32-34). Although Takahashi knew of the American intentions to use Japanese produced statistical data as a surveillance tool, he was committed to working with them to rebuild the statistical system as service to his country and, as others believed, as a step towards democratic socialism (Takahashi, interview: 30-31).

Many factors stood in the way of Ouchi's and Takahashi's efforts to rebuild the statistical infrastructure. Ministerial officials fought over budget allocations and staff resources, and over the appropriate institutional location for a permanent overseeing body. Demands for data slowed the process, and shifts in American domestic politics impacted occupation policies. Rice and his delegation of senior experts left quickly, failing to meet promises to their Japanese counterparts to work jointly on a number of projects and reports (Takahashi, interview). Replacement staff members were younger, had much less expertise, seemed to lack a commitment to development at the system level and contributed to destructive sectionalism and poor communication among ministries (Nagayama, interview: 11). Moreover, they represented the shift to a more conservative American political stance that sought to purge what was perceived as socialist leaning research.

Takahashi eventually lost his position as representative of GHQ on the committee in the leftist purge, and went to JRSI to serve as Ouchi's second in command. Though Ouchi and Takahashi's subfield of social statistics didn't produce the socialist revolution from within the Japanese government, their achievements as designers of the statistical infrastructure were considerable (Goto, interview; Kudo, interview), as was their success in institutionalizing the discipline of social statistics itself as a legitimate academic field, complete with a professional association and publications.

Morita Yuzo, a generation behind his peers on the central committee represented a new generation of statistical expert and pursued an entirely different path than Ouchi to institutionalize a place for statistics in postwar governance. As director of the Central Statistics Bureau (CSB), he led efforts to establish scientific standards as the foundation of statistical work (Morita, interview: 58). He saw the politically charged infighting among ministries over jurisdiction, and the inconsistency of training from one generation to the next, as serious detriments to the development of the field. Unlike his senior colleagues of the committee, Morita had been trained in probability and inference through American and English texts before the war, (Morita, interview: 65-67). His own texts were required reading for new staff, and he lectured on sampling methods in regional offices (Morita, interview: 52-56). To reinforce the importance of scientific standards in statistical work, Morita went further than training by institutionally separating research methods and analysis, along the lines of administrative structures in other advanced countries (Nagayama, interview).

Morita went beyond the CSB to develop postwar statistics as an autonomous profession by working to build the Tokei Gakkai professional association that would include seasoned social scientists, mathematicians, as well as new recruits. Morita's professional networks were broad, having worked with social statisticians before the war to launch the Japan Statistics Association. His aims were to create a community of professionals who identified with each other as statisticians rather than according to the substantive areas in which they worked separately, and, in particular, to institutionalize a place for mathematical statisticians within mainstream statistical work. Very few mathematical statisticians working in prewar Japan had anything to do with their counterparts in the social scientists, and were a very isolated group, mainly focused on pure science (Morita, interview: 67-70). After the war, Morita went directly to

what was left of their professional association, Tousuuken, to appeal to the director to join the broader Tokei Gakkai. Membership at first was limited to a few personal contacts but grew to include junior colleagues across administrative agencies (Morita, interview: 71). Association journal publications also shifted overall from a prewar socio-economic focus to a socio-mathematical focus (Iochi, interview: 5).

Morita's efforts to institutionalize mathematics as part of mainstream statistical science reflected both his intellectual training and his vision for the future of statistics as a scientifically based profession. By prioritizing retraining, Morita tried to remake the whole field of statistics, rather than a vertically split field of mathematical elites and the masses, as had happened in the United States (Abbott 1988). His institutional initiatives further reinforced his ideals of a scientific profession, including the separation of analysis of data and basic research at the CSB. With Morita at the helm, the CSB grew a reputation as both a training ground for young statisticians and a more politically neutral place than the Economics Survey Office because evaluation of administrative aims beyond data collection and analysis and methods research were discouraged (Nagayama, interview: 10). Despite his relative youth and perhaps because of his efforts along different paths of institutionalization, Morita was well respected on the committee and often the definitive source for knowledge on advanced statistical technique such as sampling theory (Takahashi, interview).

Capitalizing on their connections to the political authority of the occupation, Japanese elite statisticians followed a number of different paths to institutionalize a role for themselves within postwar governance and beyond. Both the content and structure of postwar statistics reflect the efforts of the leftist social statisticians as well as the newer generation of mathematical statisticians. Unlike in the American case where the profession split vertically between

mathematicians and descriptive statisticians, elites in postwar Japan worked hard to spread statistical knowledge and skill to new recruits and in nongovernmental, nonacademic settings. Rather than diminishing the prestige of statistical work or diluting it, the expansion strengthened the field by repopulating it. Moreover, elite efforts to broaden networks within a structure of the professional association facilitated professional closure in Abbott's terms (Abbott 1988).

From job cuts to the economic miracle

In this last section, I offer a comparison of two substantive areas of official statistics, agriculture and industry, to demonstrate how, in practice, statistical science became authoritative knowledge under very different configurations of institutional culture. Arisawa, another leftist social statistician on the elite central committee, credits the transformation of postwar statistics to the intellectual developments of random sampling and statistical inference (Arisawa 1960: 35). The transformation, he states, was from simple numeric representations of facts to an authoritative tool for forecasting and estimating that had applications across administration and the sciences. Focusing on a basic and practical role for statistical work in administration, Arisawa and others advocated sampling theory as a tool for streamlining surveys across ministries and as a tool for checking accuracy (Arisawa 1960: 37). In practice, these new methods of random surveys, inference, and standardization were integrated very differently into agricultural and industrial statistics.

I want to emphasize two points with this contrast. One, building on Schweber's analysis of the development of demography cross-culturally (Schweber 2006) and on Camic and Camic and Xie's studies of statistics in American social sciences (Camic 1995; Camic and Xie 1994),

the following discussion demonstrates how general scientific ideas are repackaged for institution specific settings. Just as statisticians elsewhere focused on particular methodological or theoretical features of statistical science as part of their strategies for creating new institutions or for integrating statistical work into existing structures (and thereby changing them), so too were Japanese statisticians able expand the jurisdiction of their field by integrating inferential statistics into sector specific work.

The second point is the result of their efforts, which was to change the practices and power structure of agricultural management and industrial production. In Meiji Japan when statisticians first introduced national scale statistical work into administration, their challenge was to institutionalize their new way of defining the nation and its components as part of the modern state. Postwar Japanese statisticians did not face the same kind of competition at the elite, central government level as their Meiji predecessors, but their new methods similarly challenged not only traditional ways of knowing but also positions of sector level decision making power. In detailing the process by which agricultural administration and industrial production accepted inferential statistical work differentially, the following offers more empirical evidence for Shapin and Schaffer's claim that debates about ways of knowing are simultaneously debates about who is granted the power to define reality and create it (Shapin and Schaffer 1985).

According to Kudo, one of the administrators in charge of occupation classification, the first random sample surveys done by the government were conducted under direct order by GHQ: a 5,000 household survey on consumption, and a labor survey (Kudo, interview: 9). Each was overseen by the "one person in each ministry who knew something about sampling," but were not directly overseen by Americans. In the agricultural sector, regular surveys had been conducted for decades, but none that were standardized or amenable to statistical analysis. The

first directive to assess agricultural capacity came from GHQ and drew resistance from the Ministry of Agriculture (Kuga, interview: 37). As a matter of social stability, GHQ argued, data on at least the human dimension of agriculture was needed, as returnees kept pouring in and the manufacturing sector lay in ruins. Agriculture Ministry officials deflected the request to use their own staff and funds, saying that census surveys were done by the CSB.

The catchphrase "100,000 returnees 100,000 tons of rice" expressed the pressing need for revitalizing the agricultural sector after the war, however, and despite resistance from Ministerial staff, GHQ pressed on for data. Kuga produced survey data on land lost during the war to manufacturing or other activities (Kuga, interview: 47), and with some difficulty, estimates for imported food assistance. Agricultural capacity was all but demolished, and people were starving (Dower 1999). MacArthur had told American officials to "send food or send troops" but was refused because the Americans did not trust the numbers coming out of the ministry (Kuga, interview: 48-50). Macarthur went directly to Kuga, who was known as the one real statistician who could defend his calculations. When his calculations came back close to GHQ estimates, Macarthur submitted Kuga's numbers for food assistance, which arrived within a week. Though Kuga had depended on data from non-statistician colleagues, MacArthur credited the breakthough to him individually. The effect was, in a word, transformative. Agricultural Ministry staff finally saw the value in statistical knowledge and began recruiting and retraining (Kuga, interview: 48-50).

Even after the Agriculture Ministry accepted the need to integrate statistical knowledge to their work, the transition was not easy. Given the labor intensity of the work, as well as a commitment to serving the agriculturally based population displaced by the war, the Ministry had employed huge numbers of local staff and surveyors, many of whose jobs were cut as the

enthusiasm and demand for agricultural statistics grew. Not only job cuts, but infrastructure redevelopment caused even more conflict between those invested in the more traditional structures and those who supported the integration of statistical work. Kuga again facilitated the transition with a compromise between proposals for reforming the system. As was Ouchi's plan for centralized but accountable statistical system in general, Kuga's plan for reform granted some central power by maintaining both the large scale census and sample surveys, but also encouraged the democratization so important to the democratic movement by securing jobs in the regional branches to collect both statistical data and continue the more labor intensive, seasonal interview and observational surveys with traditional methods (Kuga, interview: 52-53, 60).

Job cuts and reforming the system were not simply practical proposals, but steeped in the politics of the occupation, shaped by the discourses of democratic and socialist reform. Not only did the increasingly conservative GHQ push for job cuts to allow for the growth of more statistical work in the Ministry, but then Prime Minister Yoshida, who purportedly "couldn't stand the far left" demanded left-wing purges across government agencies. Agriculture, and the Economics Research Bureau where Takahashi worked, were particularly hard hit, the former shrinking from 5000 to 800 staff members (Kuga, interview: 57, 70).

Following the job cuts, even ministerial staff thought to postpone the local surveys, when occupation politics demanded that they find a way to do it. Again, Kuga the statistician was singled out. By this time, Kuga's skills as senior statistician had earned him a privileged relationship with GHQ staff, who confided in him the real need for local surveys, which was entirely political. Rather than depend upon Kuga's statistical data as objective and transparent, GHQ officials informed him that in international meetings among the Russians, Chinese,

Americans and British, they were under pressure to produce data from a third party that would confirm whether or not agricultural reform in Japan was a fraud. Landholding traditions in the agricultural sector itself had been targeted as feudalistic and potentially threatening for the development of a democratic social order. Kuga was thus warned that "it would cause international problems, so even if the survey results say that it is a fraud, don't report it" (Kuga, interview: 60-61).

Both the structure of the agricultural sector, and the government agency that supports and regulates it were overhauled during the occupation. Statistical knowledge, and those trained to employ it, led the way in designing and implementing reform. But their path was not easy. Many conflicts arose, many jobs were lost, but ultimately, statistical methods assessing, evaluating, and planning solidified a link between political and scientific authority that changed the mode of administration.

For reasons similar to those that put the agricultural sector in the center of focus for political officials, the industrial sector drew attention from policy makers as a critical site of intervention. Rebuilding both sectors was essential for stabilizing a devastated country after the war. Both sectors needed to be assessed and rebuilt to secure social stability, and ideally, reflect new, democratic values and relationships. Elite statisticians and business leaders poured over international categorizations, analyses, and census schedules in an effort to determine how to categorize, when to schedule censuses, and how to produce comparable data on everything from consumer goods to occupation types and industrial output. With social stability as the short-term goal and the 1950 census as the mid-term, troops of statistical staff were sent out to assess manufacturing capacity, while the tools of their work were constantly being redefined (Central Statistics Bureau 1972b; Koyanagi 1951; Tsutsui 1996).

As economic reconstruction became the rallying point for sacrifices demanded of the Japanese people (Dower 1999; Hein 2004), elite statisticians turned to one of their own, Goto Masao, to research the current state and future of statistical quality control in Japan as a potential tool in organizing production for export (Goto, interview: 55). Goto was a founding member of the Union of Japanese Scientists and Engineers (JUSE or Nikkagiren), a professional association formed during the war dedicated to finding ways to improve the quality of Japanese products. Statistical quality control was yet another way that the intellectual developments of sampling and inference were integrated into the highest level of postwar reconstruction policy at the initiative of statisticians fortuitously seated at the center of power.

Implementation of plans to reform the industrial sector went much more smoothly than in agriculture. Impressed by his first visit as a member of the first Rice Commission, Goto extended an invitation to an American statistician, W. Edwards Deming, through JUSE, to offer training courses on statistical quality control not within government agencies, but on the factory floor. Over the course of a few extended visits between 1947-1951, Deming reportedly gave almost daily lectures to audiences of up to 600 people, in addition to training courses that spanned many days (Tsutsui 1996). Deming's courses included lectures, demonstrations, discussions and practicum on elementary and applied mathematics, sampling and probability methods, and inspections. Deming was noted for his delivery of complicated methods in simple form, for teaching beyond small groups of specialists, and ultimately, for transforming Japan into the postwar economic "miracle" through basic training in statistical quality control (Koyanagi 1951; Morrison 1987; Nixon 1962; Tsutsui 1996).

Although Goto and Deming did not face resistance from invested government administrators, there was certainly potential for resistance from factory managers and workers.

Strategically, Deming's seminar participants were drawn from the top of the business elite as well as from factory managers, engineers, and a growing cadre of industrially based statistical workers (Goto, interview: 54). Perhaps most importantly, the unions were in favor of learning new techniques that would provide lower and middle level workers a significant amount of new skills and potentially decrease the gap between them and management (Goto 1981, interview: 58). The major innovation, aside from simply reaching all levels of administrative and corporate workers, was to introduce the concept (and give the tools = sampling) of consumer research and redesigning in to production. Through its introduction into industrial management from administrative statisticians, the new tool of sampling for quality control in production and of evaluation in consumer markets secured statistics again as authoritative knowledge even beyond the administrative sector (Koyanagi 1951: 8-9).

The development of statistical expertise outside of administration, and even outside the academy, marks an important difference between Japanese and other countries. As mentioned above, spreading statistical work outside a small group of elites did not diminish the scientific authority of statistics as it did in the US (Abbott 1988), but rather contributed to its strength as an indispensable tool for national reconstruction across institutional spheres. Under the particular historical circumstances of occupation and postwar construction, statistical science extended relatively easily in to the corporate sphere, transforming Japanese industrial production. The result was the solidification of a field of intellectual expertise with institutional strength and durability well beyond the expectations of Japanese social statisticians, elite administrators, and occupation officials.

Conclusion

When Stuart Rice first assessed the state of Japan's statistical system, he criticized not only the lack of professional integrity that he found among what was left of Imperial administration, but went further to suggest that the Japanese people themselves lacked an appreciation for objective facts and were susceptible to deception (Rice 1946). Himself a social scientist and statistician, Rice began to develop a powerful discourse that linked the democratic reform that Japan needed with the knowledge and expertise of professional statisticians. While the American experience suggested that professionalization of statistical work required complete separation from government administration, the postwar Japanese experience suggests a different pattern of development. Morita's efforts to separate administrative statistics from politics came from the same desire for professional independence, but the government as a source of resources remained an essential part of field development. Though it remained the largest one, government administration was only one of the possible career outlets for statisticians by the end of the Occupation.

Although the foundational relationship in question was between scientific and political authority, moving beyond administration played an important part in establishing statistics as the authoritative knowledge of postwar reconstruction. Rather than diminish the status and authority of statisticians as experts by extending their field well beyond the traditional academic and government sites, their willingness to update their field and spread their knowledge in the manufacturing sector deepened the perception of statistics as an objective science with significant social worth. Strengthening the scientific base of statistical work in the postwar period was thus not simply a way to protect their status as experts by monopolizing knowledge.

Conversely, scientific advance was coupled with proactive efforts to expand the field in terms of both training a new generation of statisticians and extending the boundaries of expertise well beyond a small elite group into varying institutional settings.

Postwar Japanese statisticians may not have successfully established the kind of closure that Abbott (Abbott 1988) argues must happen to call an occupation a "profession." Rice even recognized the different institutional locations and professional designations of postwar statisticians in his second, 1951 report, and urged the Japanese to go further to institutionalize statistical science as a particular profession by establishing more academic departments and strengthening the professional associations (Rice and Dedrick 1951: 1-2). Had the Americans been completely successful in replacing the statistical (and political, economic, etc) system under the Occupation, then one might expect that Abbott's American model of "professionalization failure" would have been repeated in Japan. In fact, the Japanese case suggests other possibilities for theorizing the necessary factors, relationships, and processes of professionalization. For occupations that have developed historically in multiple institutions, the test of professionalization seems misapplied. Rather, the multi-level, dynamic conception of a field of activity provides a better framework for understanding the development and change in systems of knowledge and their relationship to governance.

Building on the insights of Bourdieu's framework for field analysis (Bourdieu 1990), I have explained the development of statistical science in postwar Japan as a combination of 1) the operationalization of discourse (Gamson 1992; Swidler 1986) developed in a particular historical setting, 2) the intentional efforts of strategically minded elites to build a multi-institutional field of scientific work (Bourdieu 1990; Bourdieu 1993; Camic 2001; Camic and Xie 1994; Campbell 2004; Gieryn 1999; Gieryn 1983); and 3) the contingent, locally specific resolutions of

intellectual and institutional conflicts (Bourdieu 1990; Bourdieu 1993; Camic 1995; Porter 1995; Schweber 2006). The intellectual, professional, scientific and political strength of statistics in postwar Japan cannot be explained as a process of simply professionalization, nor was the combination of a powerful discourse and political authority of American occupation officials enough to produce the broad field of expertise that solidified in the postwar period. Rather, this study demonstrates that statistical ideas and the structures that support them in postwar Japan are expressions of a historically specific relationship of scientific and political authority.

Chapter 4: Creating Japanese Statistics

Japanese statistics developed variously as a powerful tool of statecraft, a uniquely political social science discipline, a profession with close ties to government administration, and a tool of industrial labor and management that transformed economic production. Each of these various paths of statistical expertise was nurtured from ideas through institutionalization by individuals with commitments to both the development of science and of the Japanese nation. The present research attempts to explain the rise of statistics as a diverse but integrated field of expertise shaped by national political culture. By narrowing my analysis to two watershed periods of political change, I was able to emphasize the interactions of political discourse with the development of scientific ideas and the active development of institutional structures. I approached the question of field development by investigating the ways that statisticians themselves defined their work intellectually in two periods of dramatic social and political change in modern Japan. I also investigated the strategies used and organizational locations in which statisticians attempted to build an institutional infrastructure for their work.

Although my analysis was not designed to provide direct comparisons with other national systems, I tried to demonstrate through the interaction of cultural discourse, institutions and intellectual developments, how Japanese statistics have developed with a particular national character that distinguishes it from other places. Despite the intentional work of statisticians to create scientific standards in their work to tie themselves explicitly to a broader scientific community, this research explains how scientists respond to localized needs in developing both their professional infrastructure as well as the content of their work. In Japan, the development of a specifically political discipline of social statistics is one particularly visible example that sets

the Japanese field apart from those of other nations. The development of statistical quality control in postwar economic reconstruction as an expansion of the field that strengthened rather than weakened the cultural and social authority of statisticians is another. In this final chapter, I want to reiterate how I think the empirical evidence of the Japanese case suggests ways to refine our frameworks for understanding the relationship between scientific and political authority, the development of professions, and the structure of expertise.

Statistics as politics

Statistical methods have been argued to be a match for democratic governance based on their capacity for providing objective information for public consumption and by institutionalizing a means for securing fairness in representative government (Prewitt 1987; Prewitt 2001). The approach of this research suggests that a match is best characterized to be one created at the discursive level specifically, and that empirical studies are better focused on explaining how that discourse is enacted. Many other scholars have demonstrated how the procedures of statistical data collection facilitated nation building projects around the world by institutionalizing new conceptualizations of social order (Anderson 1991; Asad 1994; Hirschmann 1989; Loveman 2001; Mitchell 1988; Nobles 2000; Patriarca 1996; Stoler 1995; Ventresca 1995). Statistical classifications backed with the authority of the state redefined the national entity along with its component parts subjecting populations to new categorizations that structured their social relationships (Scott 1998). Kuhnle (Kuhnle 1996) also demonstrated how a general social welfare discourse manifested with different national emphases as it became embedded in differently structured institutional settings of national statistical research.

In this study of Japanese statistics, I showed how statisticians during the Meiji period responded to the task of building a strong centralized government by arguing the need for administrative programs that both practically and symbolically unified the country. While his own intellectual leanings were more radical, Sugi's efforts to integrate statistical research in administration were ambitious but practical, focusing on implementing a modern population census. Over the course of two decades, he struggled through various setbacks to establish the population census within government as well as independent training centers for staff. Sugi's competition among the first generation of Meiji elites were those of the old order who wanted to maintain the household registers as both an administrative data gathering program and a means of social control through surveillance. The struggle for establishing statistics and the modern population census in Japan was an example of what Shapin and Schaffer characterized as the politics of scientific debates (Shapin and Schaffer 1985). The stakes were not just intellectual, but inherently political. They were not simply about methods of recording population figures, but about determining who would be granted the authority to rule based on the perceived truth value of their knowledge.

To emphasize how a link between scientific and political authority was developed discursively, I also explained in detail the content of debates about translated works of statistical science. Sugi and other statisticians, located in the academic sciences or within the elite of Meiji government reformers, debated about the nature of statistical science itself, whether it was a discipline in and of itself or a tool to be used widely across science and administration. These debates were similarly about defining a new order in Japan on many levels. Many believed that statistical research garnered a new order of facts that revealed laws and fundamental relationships (Donnelly 1998). Some argued that as a discipline, statistical science had a special

relationship with the state, and should thus be the foundation for modern governance as the science of social life. Others argued that defining statistics as the science of state did not appreciate the breadth of objects amenable to statistical research, including the Imperial House, which was held to be outside the state, and therefore could not accept a definition of statistics that would be so constraining.

Each position was argued as a variation on the link between scientific and political authority by using discourses of scientific objectivity and rationality to define the nature and aims of modern governance. Some emphasized the need for establishing scientific modernity in the state by using scientific tools within more traditional structures of power. Others argued to replace governing structures with those founded on rational, objective knowledge production. Yet others defined the modern state as the realization of a statistically based social science.

In Chapter three, I also explained how leftist social statisticians were granted an enormous amount of power by the occupation authorities, and how they used the discourse of scientific objectivity to establish statistics as the foundation for reforming administration, rebuilding the economy, and defining Japanese democracy as transparent and accountable. Postwar statisticians did not have to define statistical science intellectually, as their predecessors did, because statistical work was by then recognized as a specialized form of scientific work. American authorities and teams of experts working for them created a powerful discourse that explicitly linked the objectivity of statistics to democratic reform. The task of statisticians, once placed in positions of power, was to create the infrastructure across administration, academic, corporate in which statistical work in practice, and the discourse of objectivity and transparency that supported it, could be embedded (Fourcade-Gourichas 2000).

Statistics as a profession

Embedding the discourse statistics in particular as an objective science and a tool of democracy in postwar Japan was one strategy employed by individuals to build a professional infrastructure. Morita in particular, as head of the Central Statistics Bureau, breathed new life in to administrative statistics by recruiting new staff and training them in the most current methods of survey design and analysis. His efforts to institutionalize career paths for statisticians within administration included reaching out to former colleagues in social statistics and mathematical statistics to come together in forming a stronger scientific base for a restored professional association. In my reading of the historical accounts, Morita took the discourse very seriously. His actions would at least suggest that. He put great effort into establishing a more democratic, less hierarchical culture within the Central Statistics Bureau and among its regional affiliates. He also created a culture of work that separated politics and evaluation of administrative aims explicitly from methods and analysis.

Although Morita's efforts suggest a recognizable effort to professionalize statistics by establishing scientific standards at the foundation of practice, separating intellectually and institutionally from politics, establishing standards for training, and reconstituting a stronger professional association (Abbott 1988; Starr 1982), an important difference between the Japanese case and other national systems is the way that Japanese statistics have always been intimately connected to government administration. The American model of professionalization suggests that professional autonomy means to be separate from the organizational hierarchy of state administration, but in postwar Japan, statisticians achieved professional status while maintaining that connection.

I argued in Chapter three that two other developments marked the Japanese case of professionalization differently from others. One was the expansion into factories of inferential statistics. Not only did it exemplify the efforts of elite statisticians to disseminate knowledge widely rather than protect a monopoly on expert knowledge (Haskell 1984; Larson 1984), but it also reconfigured the field of statistical work to include the corporate sector (Abbott 1988). Newly trained statisticians included factory floor managers and union representatives committed to developing competitive products for rebuilding the postwar economy. Rather than diminishing the power of expertise by diluting it, the expansion increased cultural and social authority for statistical work by demonstrating its utility in Japan's remarkable postwar economic recovery.

The other example I discussed was perhaps not a deviation from professionalization models, but an explicit recognition of a political component. Statistical research, particularly newer survey methods and inferential statistics in the postwar period, were strongly resisted in the Ministry of Agriculture (MOA), where traditional data gathering methods were preferred, along with the social relationships that supported constant updating of locally specific records. This dynamic echoed the kind of politically charged intellectual debates of the Meiji period. Kuga, the one statistician on staff at the MOA struggled against peers but was singled out by occupation officials on more than one occasion specifically for his skills as a statistician, and for his discretion in interpreting data. Whereas the Foucaultian conceptualization of professional power suggests that the knowledge of being watched results in no one being entrusted with discretion (Porter 1992: 49), the discussion above suggests that in fact discretion and political authority can be explicit elements of professions.

I have tried to argue that these examples are not simply exceptions to the rule but that the Japanese case suggests ways to refine how we understand the development of professions.

Although Abbott (Abbott 1988) and Starr (Starr 1982) have much to offer in their conceptualizations of how professions are made and sustained, their frameworks are based on American social structures and relationships, and are thus culturally specific. As Fourcade-Gourichas demonstrated in her comparative study of economists and their efforts to professionalize in three different national settings, the institutional relationships that define American style professions are not applicable elsewhere in their entirety (Fourcade-Gourichas 2000). Rather, national configurations of governmental, economic, administrative, and educational infrastructures shape the development of professions and disciplines differently. In Japan, the connection to government administration and the extension into economic production establishes yet another pattern of professionalization to be integrated into analytic frameworks that can accommodate greater complexity.

A national field of expertise

As a branch of mathematics, an integral part of government administration, and a methodological tool used across the scientific disciplines, contemporary Japanese statistics look much like statistics elsewhere. Numerous professional associations support basic and applied statistical work across subfields. Japanese statisticians have a number of career paths open to them in private and public corporate research institutes, government administration, and in various academic fields. In fact, statistical work in contemporary Japan, as elsewhere, is so varied, that it would be difficult indeed to design an empirical study that could address all the variation within the field, or that could define the boundaries of the field in an analytically meaningful way (Desrosiéres 1998). While the ambiguous boundaries of the field might be

reason to declare it a failure of professionalization and establishment of jurisdiction (Abbott 1988), I have argued that perhaps our frameworks that categorize statistics as either a profession or discipline have simply been misapplied. As a system of knowledge, classification, logic, and a technique of power in the Foucaultian sense, many have demonstrated, this research included, the role of statistics in establishing modern power. Recognizing the greater complexity of statistics as it has developed both conceptually and in terms of its infrastructure, I have tried to demonstrate the interactions of ideas, institutions, and political cultures as a more appropriate framework for empirical analysis.

In an effort to maintain the analytical power of many concepts from studies of professions but to build a framework that better suited the historical rise of Japanese statistics, I drew upon Bourdieu's theory of field analysis (Bourdieu 1975; Bourdieu 1990; Bourdieu 1991; Bourdieu 1993). In addition to the way that field analysis provides a different unit of analysis for framing the complex development of statistical work as interrelated subfields across institutional boundaries, one other element of field analysis was particularly useful for understanding the Japanese case. Specifically, Bourdieusian field analysis consists of a number of steps in creating a conceptual and structural topography of the field in question (Benson 1998; Brubaker 1993; Kim 2009). The first of these steps is to locate the field of statistics in relation to the field of power, which is the field "at the dominant pole of the all-encompassing [nationally specific] field of social classes" (Benson 1998: 465). Professional work, which involves the production of expert knowledge, is located in the field of cultural production, and each profession is configured differently according to its conceptual and structural ties to cultural or economic production. Statistical work, I argue, is located a unique position among professions in that it is more closely tied to the political rather than the economic sphere. Recognizing this unique position changes

the ways that we can think about the commodification of statistical knowledge or the pursuit of market protection. Whereas these processes would be considered essential for other professions to secure their autonomy, this is not the case with statistics. The relevant constellation of Bourdieusian social and cultural capital for statistics is scientific and political, rather than scientific and economic. And thus the processes of interest, I would argue, are those that increase political capital, or the link between scientific and political authorities.

Building on other studies of the rise of statistics in particular settings (Desrosiéres 1991; Desrosiéres 1998; Hacking 1982; Hacking 1986; Hacking 1990; Porter 2002; Porter 1986; Porter 1995; Starr 1987; Stigler 1986), my attempt to build a framework in which the relation to politics is made explicit consisted of identifying interactions among discourse, institutions, and ideas, specifically within a particular national setting. In each of the preceding empirical chapters, I explained the development of statistical science in postwar Japan as a combination of 1) the operationalization of discourse (Gamson 1992; Swidler 1986) developed in a particular historical setting, 2) the intentional efforts of strategically minded elites to build a multi-institutional field of scientific work (Bourdieu 1990; Bourdieu 1993; Camic 2001; Camic and Xie 1994; Campbell 2004; Gieryn 1999; Gieryn 1983); and 3) the contingent, locally specific resolutions of intellectual and institutional conflicts (Bourdieu 1990; Bourdieu 1993; Camic 1995; Porter 1995; Schweber 2006).

I have argued that the national setting is not only important in terms of institutional structures and relationships, but also culturally, in the way that scientific and political discourse. I focused on two watershed periods in Japanese political life, and in so doing, was able to explicate the ways that scientific and political discourses were generated in response to Japan's relative position to other nations, and how statisticians brought the two together to their

professional advantage. I demonstrated specifically, through analyses of intellectual debates and processes of building an infrastructure for statistical work, how the production of scientific knowledge was shaped at the intersection of national political discourse and institutional cultures. Taking seriously Shapin and Schaffer's claim that debates about ways of knowing are inherently political and potentially transformative (Shapin and Schaffer 1985), I examined the debates around defining the meaning and scope of statistics in the Meiji period, and struggles over the appropriate application of various statistical methods to different social spheres in the postwar period, as discursive reflections and manifestations of struggles among political stakeholders. In the case of Japanese statisticians, general political discourses were specified in language that resonated with particular institutional aims in ministerial administrative agencies and academic settings in both periods, and also in the manufacturing sector in the later period (Schweber 2006). The development of Japanese statistics along many institutional paths and with varying conceptual emphases provided evidence for the analytic power of a broader framework for understanding statistics as a profession, a scientific method, an academic discipline (either of mathematics or social science), a tool of state, and a link between social and political authority.

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