

**RECKONING THE NATION:
19th–CENTURY STATISTICS, PROBABILITY THEORY AND NATION-BUILDING**

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Abstract:

Statistics are frequently viewed as straightforward and technical tools – applicable to the study of literally anything - capable of revealing ‘natural truths’ that are apolitical, objective and universally accepted by experts. However, the universal and unquestioned application of statistics is remarkable when one considers that some historical iterations of statistics used hardly any mathematics at all (see Porter, 1986; Hacking, 1991; Behrisch, 2016). Even the most cursory review of internal and external histories of statistics and probability shows that techniques like averages and correlations are historically contingent concepts that were developed not at the abstract level but rather through considerable discussion about specific natural and social problems. Statistical techniques and their interpretations changed over time as a result of debates over specific problems and fields of application as they became increasingly universal (Hacking, 1975/2006; Gigerenzer, Swijtink, Porter, Daston, Beatty, Krüger, 1989; Desrosières, 1998; Chatterjee, 2007).

This dissertation opens the ‘black box’ of statistics through an examination of an early phase of social statistical history: the national statistics of the 19th and early 20th centuries. My research question asks: how were statistical techniques - including list-making, social category standardization and quantitative metrics - justified and developed by statisticians for the study and management of 19th century national populations? This dissertation makes three key conceptual contributions to two separate academic literatures: 1) *the literature on methodological nationalism* (Wimmer and Glick-Schiller, 2003) and *the literature on 19th-century nationalism* (Hobsbawm, 1979; Anderson, 2006; and 2) *the history of science and science and technology literature on 19th-century statistics* (Patriarca, 1996; MacKenzie, 1981; Prévost, 2008; Desrosières, 2008b). First, I argue that there is a tendency in the nationalism literature to *under-problematize* the contribution of 19th-century statistics to the construction of national imaginations. When statistics is mentioned, it is often reduced to issues around the construction of social (and linguistic) categories of belonging (Hobsbawm, 1979; Hobsbawm and Ranger, 1992). These subjects are clearly worthy of attention but the story of the specific statistical techniques themselves – including the administrative systems implemented to collect social information from largely illiterate populations, the efforts to standardize list categories intra- and inter-nationally and the epistemological justification for the application of mathematical techniques from astronomy to the interpretation of social lists – are not interrogated, not even by Anderson (2006). I contend that this is a missed opportunity, particularly given the ongoing prevalence of methodological nationalism in the practice of social analysis (Landolt, Goldring & Pritchard, 2022; Wimmer & Glick-Schiller, 2003). Second, I extend the small existing literature on early European list-making. I note that histories of statistics tend to include a very limited interrogation of early lists (usually only the London plague counts that were used as the basis for John Graunt’s *Political Arithmetik*). They treat list-making as a *fait accompli* and not a technique that was itself also developed over time (Todhunter, 1949; Chatterjee, 2003; Hald, 2003). This dissertation puts a number of detailed secondary literatures on historical list-making practices - many of which were only published in French or deal only with single regions - into conversation with one another, allowing me to make more general observations about social list-making practices conducted by European powers on European and colonized territory from the 16th-century onwards. Finally, through my analysis of the early texts used to justify the application of quantitative techniques to the social sphere and the early IIS debate, I argue that international comparison was an explicit goal of early statistical practice that promoted the standardization of bureaucratic organizational structures, data collection work practices and statistical categories across IIS member nation-states.

Dedication:
For my dad

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CHAPTER 1: INTRODUCTION

There are three kinds of lies: lies, damned lies and statistics
- attributed to Benjamin Disraeli

Statistics is a “black box” or “a piece of machinery or a set of commands [so] complex [that] in its place they draw a little box about which they need to know nothing but its input and output” (Latour, 1999, 2-3). The contemporary conventional understanding of statistics is that it is a ‘science’ of applied mathematics applicable to the analysis of, quite literally, everything. The universal application of statistics is remarkable when one considers that some historical iterations of statistics used hardly any mathematics at all (see Porter, 1986; Hacking, 1991; Behrisch, 2016). Most statistical histories suggest that the first use of the term is German, “*Statistik*”, and can be found in the 1749 work of law and politics, “*Abriss des neuesten Staatswissenschaft der vornehmsten Europäischen Reiche und Republicken*”, by Gottfried Achenwall² (Porter, 1986, 23; Desrosières, 2008a). The methods used by Achenwall’s *Statistik* were *not* particularly quantitative. Instead, Achenwall’s science was a German encyclopedic summary of all things and activities related to the *Lande und Leute* (land and people) belonging a particular state, that “extend[ed] from geography and climate to government, economics, agriculture, trade, population and culture” (Porter, 1986, 25; Desrosières, 2008a). Statistics only formally became a discipline of mathematics in the very late 19th and early 20th centuries due largely to the efforts of Karl Pearson and Francis Galton.³ Statistical units in mathematical departments only became common place after the Second World War (Mackenzie, 1981; Porter, 1986).

Throughout the 19th and early 20th centuries, statistics began transitioning from the *methodologically ambiguous study of all facets of the state* to *applied mathematical discipline* driven, in part, by the proliferation of the complex bureaucracies of the nation-state (Porter, 1986, Desrosières, 2008a). During this time-period, the techniques used by statisticians became

¹ Translation: “Outline of the new political science of the noble European empires and republics”

² However, the mathematical historian, Anders Hald (2003), suggests that the term is actually of Italian origin, derived from the Italian word for State (*stato*) linked to a much older practice of state craft (2003, 82). Most historical works on statistics tend to focus on Achenwall and so I have done so as well.

³ The first department was founded at University College London by Karl Pearson in 1911 and the first textbook of mathematical statistics was published in 1918. Statistical departments did not proliferate in universities until after the Second World War (Agresti and Meng, 2013).

increasingly quantitative, but the focus of statistics remained, more or less, the 19th -century nation-state – the people in it, their habits, their characteristics, their trade (Hacking, 1991; Porter 1986; Hald, 2003). The people developing quantitative techniques for the study of human populations were an unlikely team of ‘social scientists’ including government statisticians, astronomers, engineers, mathematicians, and physicists who were eager to draw parallels between the natural and the social worlds. Galvanized by Isaac Newton’s successful discovery of the natural law of gravity, they hoped to apply similar mathematical approaches to the social sphere to reveal its gravity-esque natural laws. The lofty ambition of this group was to make statistics into an exact science and govern based on Nature’s will (Porter, 1986; Stigler, 1999).

Statistics is often relegated to the domain of the mundane and the technical. It is frequently conceived as a mere tool without social or historical origin, capable of penetrating ‘natural truths’ that are apolitical, objective and universally accepted by experts. As a result, the field of statistics can sometimes give the impression that it was developed at a purely abstract mathematical level as a simple “*outil de preuve*”⁴ (Desrosières, 2014, 98). However, even the most cursory overview of internal and external histories⁵ of statistics and probability show that techniques like averages and correlations are historically contingent concepts that were developed not at the abstract level but rather in relation to specific natural and social problems, in particular historical contexts (Hacking, 1975/2006; Gigerenzer, Swijtink, Porter, Daston, Beatty, Krüger, 1989, 1; Desrosières, 1998, 166; Todhunter, 1949; Chatterjee, 2007). Further, any examination of the history shows that there were various and sometimes competing approaches to understanding and institutionalizing the techniques that we now refer to as statistics. There is a need to understand the fundamental role that statistics plays in laying the groundwork for the modern nation state and colonialism.

This dissertation opens the black box of statistics with an empirical examination of one phase of statistical social history: the emergence of national statistics in the 19th century. Specifically, I analyze the historical discussions held by one of the premier groups of scientists responsible for this endeavor as they 1) epistemologically justified the application of mathematical techniques to the study of human social groups and 2) expanded and refined existing list-making techniques and developed meaningful quantitative metrics to understand the social categories included in those lists. I do this through an historical examination of materials from three different

⁴ Translation: Tool of proof.

⁵ Histories written by disciplinary insiders (internal) and disciplinary outsiders (external).

sources: 1) Pierre-Simon de Laplace's *Essai philosophique*⁶ (1814) used to epistemologically justify the application of mathematical techniques to the social sphere; 2) the three major works of Adolphe Quetelet that were used to further cement this epistemological justification and flesh out some basic statistical metrics; and 3) the *Bulletin of the International Institute for Statistics* between 1886-1912 as a site where a wider variety of list-making and quantitative techniques were debated and formalized.

My research question asks: how were statistical techniques - including list-making, social category standardization and quantitative metrics - justified and developed by statisticians for the study and management of 19th century national populations? What do these mathematical techniques actually mean in relation to the human populations they claim to describe and how were these meanings historically generated? Histories of statistics tell us that mathematical concepts *were not always applied to the study of human populations* (Gigerenzer, Swijtink, Porter, Daston, Beatty, Krüger, 1989; Desrosières, 1998; Chatterjee, 2007), so I ask, how were they made meaningful and relevant? What were the problematics, debates and disagreements that led to their adoption?

Why does this matter? The point of this dissertation is two-fold. First, it is an analysis of an underexamined approach or element of 19th-century nation-building similar to print, national vernaculars and national history (Anderson, 2006; Hobsbawm, 1979; Hobsbawm and Ranger, 1992). Statistics during the 19th century was largely developed in the service of the nation-state for the management of national populations. It became the primary knowledge-generating technique of what Foucault calls (2004) "population thinking" – the approach to governance employed by the liberal political administration. Yet examinations of the specific statistical techniques used during this period are largely absent from both the traditional literature on 19th-century nationalism as well as much of the Foucauldian literature on biopolitics. A reconstruction of the debates and *specific techniques* that were developed during this period offers insight into

⁶ Translation: Philosophical essay

how the ‘population’ itself was constructed, conceptualized and manipulated by liberal 19th century political administrations. This is important because the practice of statistics during this period was quite diverse and not exclusively quantitative. Finally, it also provides an historical perspective into the ways that *methodological nationalism* – understood as the naturalization of the global regime of nation-states by the social sciences- was practically integrated into social knowledge-generating practices (Wimmer & Glick-Schiller, 2003, 576).

Second, I argue that an analysis of this period is an important part of the history of ‘big data’ or ‘social datafication’ (Burkhardt et al., 2022; Hoeyer, Bauer and Pickersgill, 2019; Mayer-Schönberger & Cukier, 2013). Burkhardt et al. (2022) understand this as change in the social processing of information whereby “ever increasing areas of social, political and economic life, including everyday administrative process, welfare/social provisioning, education, daily news coverage, cultural and industrial production [are] transformed by the increasingly automated generation and processing of data” (9). However, critiques of (or paeans to) ‘big data’ require a historical perspective on the phenomenon. The 19th century was the first historical period when state-apparatuses in Europe, Japan and the Americas began 1) regularly inventorying people according to a broad array of social characteristics and behaviours that the nation-state deemed useful for understanding them; and 2) applying new mathematical techniques to manipulate and interpret these lists. This period saw the introduction not just of the modern national census but of a series of other administrative lists as part of the proliferation of the bureaucratic infrastructure of the nation-state. These lists sought to categorize and enumerate various aspects of people’s behaviours, health or activities relevant for major national institutions (e.g., schools, hospitals, etc.) or economy (e.g. labourers, strikes, etc.). Mathematical techniques, imported largely from astronomy, were used to manipulate these lists and generate statistical indicators intended to represent social processes.

Third, an understanding of how population lists were constructed *and the quantitative metrics developed to interpret them* helps us to denaturalize and historicize the knowledge that was generated with them. This is important for historical and current understandings of ‘datafication’. Significant political power is frequently attributed to “the algorithm”, yet the literal

mathematical (not popular) definition of algorithm⁷ is frustratingly vague: “A precisely described routine procedure that can be applied and systematically followed through to a conclusion” (Clapham and Nicholson, 2014). There is no *one* algorithm to which we can attribute infinite power. Instead, there are *multiple* “precisely described routines”, invented by people, that are constantly being invented, refined, reified and dismissed. My central contention, following Desrosières (2008a), is that if we are to understand and critique statistical thinking in governance or “the algorithm”, we must include a nuanced understanding of social processes behind the *mathematical procedures themselves* – both the work done to enumerate the human population into discrete categories and the social and political discussion and contention that goes into developing these categories, quantitative metrics and their interpretations— into our analysis. We must historicize and humanize data by examining the problematics and debates that led to the introduction, adoption and widespread application of particular techniques. This is useful for us as scholars because it situates statistical techniques within particular histories and applications. Seen through this lens, statistics is a *social phenomenon*, related to forms of local culture (i.e.: the scientific lab) that produce it and the systems that generalize its findings (i.e. an event determined by the lab is deemed to be universally applicable and/or present) (Golinski, 1998).

Methodological orientation and contribution to the sociological literature:

That said, this dissertation is emphatically *not* about mathematics. I am not a mathematician and there is very little actual math discussed in the following pages. The math that is mentioned is painfully simple and totally unremarkable: averages, variance and the normal curve. The only major claim that I make regarding math is that it is a system of representation developed by humans who existed in specific historical places and times. The idea that mathematical techniques and concepts came into existence because people (in conversation with other people) thought them up to solve specific problems should also be quite unremarkable. Indeed, a recognition of their social and historical origin does not make the mathematical techniques any less predictive or useful. The claims that I make about statistical history are easily verified by examining any history of statistics

⁷ I have included the general mathematical definition of algorithm here. I recognize that there are various specific mathematical definitions of algorithms (ex: algebraic algorithm, etc.) that include specific reference to mathematical procedures. I do not wish to understate the complexity of these processes, only to point out the very general definition of algorithm.

or probability written by a mathematician (see Todhunter, 1949 or Chatterjee, 2003). They are also consistent with logical positivist, Rudolf Carnap's characterization of quantitative approaches when he said that "quantitative concepts are *not* given by nature; they arise from applying numbers to natural phenomena" (my emphasis, Carnap, 1974, 105). Carnap (1974) elaborates:

The difference between qualitative and quantitative is not a difference in nature, but a difference in our conceptual system - in our language, we might say, if, by language we mean a system of concepts. I use 'language' here as a logicians use it, not in the sense of English being one language and Chinese another. We have the language of physics, the language of anthropology, the language of set theory, and so on. In this sense, a language is constituted by rules for a vocabulary, rules for building sentences, rules for logical deductions from those sentences and other rules. The kinds of concepts that occur in a scientific language are extremely important. What I want to make clear is that the difference between qualitative and quantitative language is a difference between language.

The qualitative language is restricted to predicates (for example, 'grass is green') while the quantitative language introduces what are called functor symbols, that is, symbols for functions that have numerical values. This is important, because the view is widespread, especially among philosophers, that there are two kinds of features in nature, the qualitative and quantitative. Some philosophers maintain that modern science, because it restricts its attention more and more to quantitative features, neglects the qualitative aspects of nature and so gives an entirely distorted picture of the world. This view is entirely wrong, and we can see that it is wrong if we introduce the distinction at the proper place. When we look at nature, we cannot ask: "Are these phenomena that I see here qualitative phenomena or quantitative?" That is not the right question. If someone describes these phenomena in certain terms, defining those terms and giving us rules for their use, then we can ask "Are these terms of a quantitative language, or are they the terms of a prequantitative, qualitative language?" (58-59)

Although Carnap (1974) obviously privileges quantitative language⁸ over qualitative for the practice of science because it offers a higher degree of precision for empirically describing nature, he does suggest that quantitative approaches are just one of many languages that can be used to describe the world. Quantitative approaches are built out of a very particular set of concepts with its own unique 'grammar'. Although he is clear that its influences should *not* be overestimated, Carnap (1974) does recognize that quantitative language is meaningless if the measurements that it analyzes are not consistently applied:

⁸ Rudolf Carnap was a philosopher and member of the logical positivist movement. I have cited him here because I find his contrast between quantitative and qualitative language useful. His ideas are part of a broader philosophical debate on the ontological status of mathematics which I am not engaging. Hacking (1999) provides a good overview of some of this debate (particularly the constructivist movement) (45-50).

It is important to understand that we cannot really say we know what we mean by any quantitative magnitude until we have formulated rules for measuring it. It might be thought that first science develops a quantitative concept, then seeks ways of measuring it. But the quantitative concept actually develops out of the process of measuring. It was not until thermometers were invented that the concept of temperature could be given a precise meaning. Einstein stressed this point in discussions leading to the theory of relativity. He was concerned primarily with the measurement of space and time. He emphasized that we cannot know exactly what is meant by such concepts as ‘equality of duration’, ‘equality of distance (in space)’, ‘simultaneity of two events at different places’, and so on, without specifying the devices and rules by which such concepts are measured (Carnap, 1974, 68).

Quantitative language is only valuable if the measurements upon which it is based are applied consistently. He indicates that the measurement of any phenomena is based on the generation and application of conventions (or rules): “conventions play a great role in the introduction of quantitative concepts” (Carnap, 1974, 59).

While Carnap (1974) does not elaborate on the nature of measurement conventions, particularly the social dynamics behind them, French sociologist and statistician, Alain Desrosières’ (2008a; 2008b; 2002) provides an illuminating development of both the social and historical generation of statistical measurement conventions and the human institutions that developed them. His *historical sociology of quantification* examines the debates, disagreements and assumptions held by specific groups of people (in this case, an expert community) as they attempted to reach a consensus regarding which statistical techniques were meaningful and useful for the study of national populations. Instead of the mathematical techniques themselves, I am interested in engaging what Cole (2000) calls the “fundamental debate” *behind* these techniques—how techniques were made applicable to certain phenomena and how their interpretations were generated.

Contributions

This dissertation uses a science and technology studies (STS) framing to understand the social and political debates surrounding the development and adoption of early statistical techniques and metrics. By analyzing the significant changes to list-making, data collection work and data analysis that occurred in the transition between proto-states and 19th century nation-states, I identify the social and political processes inherent in the practice of statistics, identifying these techniques as historically contingent, negotiated and changing. Following Desrosières (2008a; 2008b) and other

French literature not translated into English, my contribution conceptualizes statistics not as an apolitical technical tool but as an administrative vernacular. The use of this specific language to interpret social reality is dependent and made meaningful only through the formation of institutions, work processes, workers, techniques and interpretations – all initially negotiated in relation to specific problematics with specific goals in mind. My dissertation empirically demonstrates this through an analysis of the early debates held by statistical thinkers during the 19th and early 20th century, who were discussing how exactly to quantify human populations at the national level. My analysis is intentionally historical because the 19th and early 20th centuries were a “first principles” period when many statistical organizations and techniques were being developed, my findings are relevant to the understanding of the current practice of statistics.

I contribute to the sociological literature in two major ways. First, I add to the writing on nationalism and citizenship, both perennial themes in the sociological canon beginning with Weber’s (1921) ruminations on the organization of the modern bureaucracy and the “iron cage” of modernity. I do this by examining how statistical techniques were used as a knowledge-generating⁹ tools of nationalism and citizenship, or as a quantitative form of nation-building. In this dissertation, I characterize statistics as a very salient and underexamined form of national boundary-making and social valuation that demarcates the perimeters of citizenship and should be treated as a form of nation-building alongside national mythmaking, print and other medias, military conscription, taxation, education and the imposition of national vernaculars (Anderson, 2006; Torpey, 2019; Labbé, 2019; Desrosières, 2008). Enumerating and analyzing people according to classificatory systems useful to the state, subjects them to government by nation and, to a certain extent, dictates the terms of that relationship and form of belonging.

Second, I contribute to the STS literature on social statistics by expanding the empirical basis for claims made about the historical and somewhat contingent development of social statistics and bureaucratic standards (Callon, Lascoumes and Barthe, 2011; Porter, 1995; Hacking, 1991; MacKenzie, 1981 Desrosières, 2014; Labbé, 2019; Prévost and Beaud, 2012). Specifically, although parts of the *Bulletin of the International Institute of Statistics* (IIS) have been analyzed by scholars (see, for example, Labbé, 2019), an analysis of a large portion of the Bulletin has not been conducted. I contribute to the small but important literature that exists on the use of statistics

⁹ I am using this term to generically discuss techniques used to generate knowledge. I am not referring to any particular approach.

in the formation of 19th century nation-states. This literature includes Mary Poovey's *Making a Social Body* (1995), Silvana Patriarca's *Numbers and Nationhood* (1996), Jean-Guy Prévost's *A Total Science*, Morgane Labbé's *La nationalité, une histoire de chiffres* (2019), Eric Brian's *La mesure de l'Etat* (1994), Alain Desrosières' *The Politics of Large Numbers* (1998), *Prouver et gouverner* (2014) and his two-volume *Pour une sociologie historique de la quantification* (2008a/b). I note that there is a tendency in this literature to discuss 19th-century social statistics in relation to the formation of a *specific* nation-state and not to the nation-state as a political form of organization generally (see Patriarca, 1996; MacKenzie, 1981; Prévost, 2008). By analyzing the content of IIS- which includes discussions of a wide variety of nations - I can make broader claims about how statistical theory was made applicable to the nation-state generally as part of the burgeoning internationalism and colonialism of the 19th century and 20th centuries. This is important because statistical techniques were used to develop profiles of national populations and could also form the basis for political interventions. An understanding of the assumptions made by these techniques is useful for understanding the scope of these interventions.

Summary

This dissertation is an examination of 19th century statistics as it transitioned from the *methodologically ambiguous study of all facets of the state* to an *applied mathematical discipline* driven, in part, by the proliferation of the complex bureaucracies of the nation-state (Porter, 1986, Desrosières, 2008a). It uses Desrosières' (2008a;2008b) *historical sociology of quantification* to theorize statistics as an underexamined technique of 19th-century nation-building similar to print, national vernaculars and national history (Anderson, 2006; Hobsbawm, 1979; Hobsbawm and Ranger, 1992). Specifically, it offers insight from an STS perspective into how 'national populations' were constructed, conceptualized and manipulated by liberal 19th century political administrations. It does this through a reconstruction of some of the *justifications, debates* and *specific techniques* that were developed during this period to understand national populations through an analysis of the relevant works of Pierre-Simon de Laplace, Adophe Quetelet and the International Statistical Institute (ISI). I argue that statistics should be theorized as a technology of nation-building- similar to literacy and the standardization of national vernaculars - that furnishes a very compelling *quantitative* administrative vernacular of nation-states. I further contend that the

precision of statistical techniques is a feature of quantitative *language itself* that should not be mistaken for *accuracy* and demonstrate this through my analysis. This is important because it cultivates historical insight into the processes behind ‘social datafication’ (Burkhardt et al., 2022; Hoeyer, Bauer and Pickersgill, 2019; Mayer-Schönberger & Cukier, 2013). The 19th century was the first historical period when modern nation-states sought to categorize and enumerate various aspects of people’s behaviours, health or activities that were deemed relevant for major national institutions (e.g., schools, hospitals) or economy (ex: labourers, strikes) and manipulate these lists using new mathematical techniques. My analysis is innovative because I identify the social and political processes inherent in the practice of statistics, demonstrating that these techniques as historically contingent, negotiated and changing.

CHAPTER 2: THEORY AND METHODS

RESEARCH QUESTION AND MAJOR ARGUMENTS

I am interested in investigating the development of statistical techniques for the study and management of human national populations during the 19th century. My **major research question** is: how were statistical techniques - including list-making, social category standardization and quantitative metrics - justified and developed by statisticians for the study and management of 19th century national populations?

I am interested in this question because I note that there is a **research gap** in two academic literatures: 1) *the modernist literature on nationalism* (Hobsbawm, 1979; Anderson, 2006) and *methodological nationalism* (Wimmer and Glick-Schiller, 2003); 2) and 2) *the history of science and science and technology studies (STS) literature on 19th-century statistics* (Patriarca, 1996; MacKenzie, 1981; Prévost, 2008; Desrosières, 2008b). First, I think that there is a tendency in the nationalism literature, particularly the modernist literature (which I will explain later), to *under-problematize* the contribution of 19th-century statistics to the construction of national imaginations. I argue that one potential reason for this is the view of statistics as an ahistorical technique, a vehicle for the discovery of truth. When statistics is mentioned in the modernist literature, it is often reduced to issues around standardization and the construction of social (and linguistic) categories (Hobsbawm, 1979; Hobsbawm and Ranger, 1992). These subjects are clearly worthy of attention but the story of the specific techniques themselves – the administrative systems implemented to collect social information from largely illiterate populations, the efforts to standardize list categories intra- and inter-nationally and the epistemological justification for the application of mathematical techniques from astronomy to the interpretation of social lists – are not interrogated, not even by Anderson (2006). In the nationalism literature, statistical techniques are taken as given - a neutral technical process that simply reflects, rather than constructs, social reality. I argue that this is a missed opportunity and a fertile site of study, particularly given Deutsch's (1953) and Anderson's (2006) emphasis on nationalism as a process of *corporation enabled by technology*. I argue that statistics is one such technology.

Second, I extend the small existing literature on early European list-making and the practice of 19th century statistics. In particular, I note that histories of statistics tend to include a

very limited interrogation of early lists (usually only the London plague counts used as the basis for John Graunt's *Political Arithmetik*). They treat list-making as a *fait accompli* and not a technique that was itself also developed over time (Todhunter, 1949; Chatterjee, 2003; Hald, 2003). This dissertation treats list-making as a form of classification which is social, contentious and historical. It puts a number of detailed secondary literatures on historical list-making practices - many of which were only published in French or deal with single regions - into conversation with one another, allowing me to make more general observations about historical list-making practices done by European powers in many different locations from the 16th -century onwards. Additionally, although some academics have analyzed specific issues of the IIS on specific themes, no sociologist or historian that I am aware of has conducted a detailed examination of the ISI's Bulletin during the 19th century and early 20th century (Labbé, 2009; Porter, 1998). I contribute to the literature on the practice of 19th century statistics with my empirical analysis of the ISI.

My **first major argument**, therefore, relates to the technical processes used to establish 19th-century nationalism. I argue that statistics should be better included and theorized as a technology of nation-building- similar to literacy and the standardization of national vernaculars - that furnished a very compelling *quantitative* administrative vernacular of 19th century nation-states that often boasted "*privileged access to ontological truth[s]*" (my italics, Anderson, 2006, 36). Following Desrosières (2008a), I contend that the practical work and institutional protocols that went into the collection of population lists, and their quantitative analysis should be analyzed and understood as a technique of 19th-century nationalism and nation building, a form of seemingly quantitative nation-building that promoted the nation as a natural unit of social organization and development. I also note that there is limited examination of statistics in the literature on methodological nationalism (Wimmer & Glick-Schiller, 2003).

The limited academic literature that does examine the development of 19th-century national statistics tends to theorize the use of statistics by *one nation-state only* (ex: France, Italy) and not in relation to the nation-state as a form of political organization generally. I argue that this, however inadvertently, limits our understanding of the development of statistical techniques, the internationalism of the 19th-century statistical project, and also replicates the methodological nationalism of this period. As a corollary of this argument, I claim that Adolphe Quetelet and the IIS promoted a very strong form of methodological nationalism through both the *epistemological framework* they developed to apply mathematical techniques to social counts and through the

techniques themselves. I argue that an understanding of how the nation was naturalized through the practice of statistics during the 19th century offers important insight into the historical development of methodological nationalism.

My **second major argument** is that the *precision* of quantitative approaches is a feature of the quantitative *language itself* that is often mistaken for *accuracy*, giving the impression that through list-making, numbers and metrics, social reality has been simply translated to the page. Following Desrosières (2008b), Poovey (1998; 1995), Porter (1998), Lampland (2010) and Bowker and Star (2000), I argue that the use of list-making and quantitative techniques have the effect of substituting “precision for validity” (Bowker and Star, 2000, 24) or “precision for accuracy”, as Poovey (1995) frames it. This dissertation argues that the use of precise quantitative language *is no guarantee of the accuracy of that description*. I demonstrate this through a dissection of some of the historical social processes used to generate lists and quantitative metrics. I suggest that the use of statistics to describe social reality reifies the social processes, institutions and epistemological assumptions used to generate these numbers, rendering the numbers both scientifically and politically ‘objective’. As Lampland (2010) points out, “assuming that the effective use of numbers depends upon their veracity obscures crucial social processes at the heart of modernizing practices” (378). Numbers formalize and objectify social practice.

One of the major points of this inquiry is to recognize the embeddedness of statistical metrics in the social world by examining the practical, day-to-day work done to generate them. The point is to address the limits of statistical claims about social reality and incorporate the practical work done to generate the numbers into their interpretation. A recognition of the work behind their collection forces us to understand the approximate nature of social numbers (despite the precision that the mathematical technique allows) and their intimate and inseparable relation to the social values, social institutions and standardized processes that generate them. In short, the point is to recognize the social metrics as a useful human language used to describe nature rather than nature itself. As Poovey (1995) notes in her discussion of the quantitative technique of double-entry book-keeping:

The formal precision of the [double-entry] books created an effect of accuracy. Even though the accuracy of the initial records could not be verified, the formal precision of the books made the records function as if they are not only precise but accurate as well. Paradoxically, this effect of accuracy tended to represent writing as transparent to its object, even though it both created and depended on the fiction I have described.... Rendering writing transparent to such particulars - even if such transparency was merely a result of

the effect of accuracy - challenged the epistemology of rhetoric because it made language seem to point to the natural world instead of the speaker or to rhetoric's rules (Poovey, 1995, 66).

Following Desrosières (2008b) and Porter (1998), I argue that statistical techniques themselves should be viewed as an approach to nation-building through the creation of national and international statistical norms, including both the social categories and quantitative metrics used. As Porter (1998) astutely observes, “[n]umbers create and can be compared with norms, which are among the gentlest and yet most pervasive forms of power in modern democracies” (45).

In the remainder of this chapter, I develop my research problematic through an examination of the characterization of statistics in two literatures on 19th century nationalism: a) methodological nationalism and the modernist literature on nationalism and b) the Foucauldian literature. I then move to my theoretical framework based on Desrosières' (2008) historical sociology of quantification. I end this chapter with a discussion of the conceptual limits of the current study.

RESEARCH PROBLEMATIC: STATISTICS IN THE LITERATURE ON NATIONALISM

In this section, I develop my major research problematic by briefly examining how statistics is treated by two academic literatures that examine the 19th-century nation-state and nationalism: a) *the modernist literature on nationalism and methodological nationalism* and b) *the Foucauldian literature on governmentality*. I provide a brief summary of the main focus of each literature and then discuss how each literature addresses the role of statistics in 19th -century nation-building. I show that statistical techniques and the epistemology that was used to apply them to social lists tend to be *under*-theorized in these literatures.

A) Modernist understandings of the nation-state and statistics

If nation-states are not a ‘natural’ unit of human political organization, when and how did the idea come into existence? Modernist theories of nationalism claim that *the nation-state* and *the idea of nationalism did not exist before* the modern historical period, typically understood as the late 18th and 19th centuries from the French Revolution onward. They suggest that

the nation is a purely modern phenomenon, a product of strictly modern developments like capitalism, bureaucracy and secular utilitarianism. It is really a quite contingent

phenomenon, with roots in neither human nature nor history, even if today it has become ubiquitous because its nationalism accords so well with contemporary conditions. Nations and nationalism, the argument continues, can be dated with some precision to the latter half of the eighteenth century (Smith, 1986, 8)

The transition from multi-ethnic empires towards nation-states based (mostly) on national constitutions is supported by the historical record. A variety of well-known national independence movements in Europe as well as former European colonies (particularly former Spanish colonies in Latin America) occurred during the late 18th and 19th centuries culminating in the signing of a variety of national constitutions that broadly established “the will of the people” (and not the will of a divinely-ordained European monarch) as the legitimate basis for the exercise of political power (Hayes, 1926; Brubaker, 1992; Greenfield, 1992; Hobsbawm, 1979).

Within Europe, for example, the French Revolution, with its rhetorical emphasis on Enlightenment ideas and democratic principles of political rule, marked a notably dramatic departure from the political system that preceded it. In Latin America and the Caribbean, figures like Toussaint L’ouverture (1743-1803) and *El libertador*, Simon Bolívar (1783-1830), led revolutionary independence movements against European colonial powers in the nation-states now known as Venezuela, Bolivia, Colombia, Ecuador, Peru, Panama and Haiti (James, 1938). Within the Americas, the American Revolutionary War (1775-1783), marked a similarly notable transition from a colonial feudal order ruled by a divinely ordained monarch to a nation-state famously governed (rhetorically) by the people. As a general indication of this trend, **Table 1** presents a non-exhaustive overview of 18th and 19th century declarations of independence or first liberal constitutions.

Table 1: 18th and 19th century Declarations of Independence or first liberal constitution acknowledging will of the 'people' as basis of legitimate governing authority

National Constitution / Declaration of Independence	Year of first constitution, unification, absolution of absolute monarchy or declaration of independence	Colonial Power/ Occupational force	Regions colonized or Annexed territories (in period)	First general election	Suffrage? (National-level women’s vote) and non-white/ dominant vote
England	Constitution is not codified, written in Acts of Parliament. No single document exists.		North America, Indian subcontinent, Caribbean, Egypt, Palestine/Jordan, West Africa, small parts of China and Malaysia	1695	1894

United States of America	1776	England	Philippines	1788-89	1920
France	1789 (revolution begins)		North and West Africa, Mexico, regions of North America, Caribbean, Lebanon, Mauritius, Indochina	1791	1945
Haiti	1791	France, USA		1950	1957
Paraguay	1811	Spain, Brazil			1961
Spain	1812		South America, Caribbean, Philippines (through Mexico)	1879	1931
Venezuela	1821	Spain, France		1947	1946
Portugal (Liberal Constitution)	1822		India (Goa), South Africa, South America (Brazil)	1974	1934
Ecuador	1822	Spain		1948	1967
Mexico	1824	Spain, France		1917	1953
Peru	1824	Spain		1890	1955
Bolivia	1824	Spain		1839	1938
Brazil	1825	Portugal		1891	1934
Uruguay	1828	Spain		1938	1927
Italy (Unification)	1861	Spain, France	Albania, Dalmatian Coast, Horn of Africa	1861	1945
Russian Empire* (Emancipation Reform)	1861		Eastern Europe	1917	1917
German Empire*	1871		Namibia, Eastern Europe	1871	1918
Ottoman Empire* (first constitution)/Turkey	1876		Eastern Europe, Middle East, North Africa	1946	various
Japan	1889		Korea, small parts of China	1890	1945

Although the modernist literature includes different ideas about when and where the nation-state originated, a group of modernist theorists does recognize the French Revolution as the historical movement that defined nationalism, the nation-state and citizenship. The well-known sociologist of nationalism and citizenship, Rogers Brubaker (1992), bluntly states that, “the [French] Revolution, in short, invented both the nation-state and the modern institution and ideology of *national* citizenship” (my italics, 35). John Torpey (2018), similarly, refers to the French Revolution as having a “canonical status as the ‘birth of the nation-state’” (2). Further, Eric Hobsbawm (1979) also identifies the 18th and 19th centuries and the American and French Revolutions, as the period when nationalism emerged:

Given the historical novelty of the modern concept of 'the nation', the best way to understand its nature, I suggest, is to follow those who began systematically to operate with this concept in their political and social discourse during the Age of Revolution.... The primary meaning of 'nation', and the one most frequently ventilated in the literature, was political. It equated 'the people' and the state in the manner of the American and French Revolutions, an equation which is familiar in such phrases as 'the nation-state'... For it was, or certainly soon became, part of the concept of the nation in the era of the Revolutions that it should be, in the French phrase, 'one and indivisible'. The 'nation' so considered, was the body of citizens whose collective sovereignty constituted them a state which was their political expression (my italics, Hobsbawm, 1979, 18-19).

Due to its central contention that the nation-state did not exist before the modern period, the modernist literature treats nationalism as an historical political movement that builds the nation-state *through* the construction of isomorphisms between people, language, culture and territory that are characteristic of methodological nationalism as discussed by Wimmer and Glick-Schiller (2003). They define methodological nationalism in the following way:

Methodological nationalism is the naturalization of the global regime of nation-states by the social sciences. Scholars who share this intellectual orientation assume that countries are the natural units for comparative studies, equate society with the nation-state and conflate national interests with the purposes of social sciences (576).

“Isomorphisms¹⁰” are understood as an assumed one-to-one correspondence between “citizenry, sovereign, solidary group and nation” such that

.... the citizenry is mirrored in the concept of a national legal system, the sovereign in the political system, the nation in the cultural system and the solidary group in the social system, all boundaries being congruent and together defining the skin holding together the body of society (Wimmer and Glick Schiller, 2003, 583).

The isomorphisms established by methodological nationalism erect strong boundaries around who ‘belongs’ and who ‘does not’ legally, politically and culturally. They produce a “container model of society” which assumes that the nation is a naturally coherent social whole: “a culture, a polity, an economy and a bounded social group” (579). These boundaries have the impact of making any number of non-state actors, trans-national relationships or ‘non-national’ cultures analytically invisible or somehow incongruent. They also ignore the historical processes used to develop national cultures- a process that becomes painfully obvious when new nation-states are formed. Wimmer and Glick Schiller (2003), alongside other theorists such as Ulrich Beck (1992), claim

¹⁰ A term, interestingly, borrowed from mathematics.

that many major sociological theorists and theories, with some notable exceptions, fall prey to methodological nationalism from Durkheim and the Chicago School onwards. They argue that there are three major variants: 1) oversight of the nation in macrosocial theories of modernity; 2) naturalization of the nation-state in empirical research; 3) national limitation of the study of social processes. Statistics would fall into the second category (Wimmer and Glick-Schiller, 2003, 578).

These isomorphisms are clearly evident in philosopher and social anthropologist, Ernest Gellner's (1983) definition of nationalism which is succinct but elegant: "a principle which holds that the political and national unit should be congruent" (9). Gellner's characterization emerges out of his broader anthropological work on modern society:

As a consequence of its technological, productive base, modern society is homogenous, literate, technically skillful and occupationally mobile. The mobility, skill and literacy are all part or precondition of its high level of consumption and its expectation of continuous improvement (766).

Gellner suggests that "modern nationalism is a phenomenon connected with the emergence of industrial society" (1981, 755). It is the homogenizing force that enables the communication necessary to support the economic specialization of the industrial society (relative to the agrarian). Considered seminal when it was first introduced, his definition was adopted by other theorists such as Eric Hobsbawm¹¹ who I will examine in the rest of the chapter. Modernist definitions of nationalism are intended to reflect a *particular political rhetoric* used to build nation-states during the modern period and *not a political practice*. In fact, much of the modernist nationalism literature goes to great lengths to show that the various ways in which most historical nationalist claims *did not* meet their stated objectives (with some exception) – a theme I will also examine later in this chapter.

Nationalism during the modern period was a novel *political rhetoric* that was being actively refined. It was also not the political norm and had a clear political alternative: feudalism. Feudalism is a system of political organization in which a monarch inherits their power by birth and is the literal human body responsible for all political decision-making because they are believed to have been divinely ordained. It is the political system discussed in Machiavelli's *The*

¹¹ I have chosen to focus on Hobsbawm because his modernist theory of nationalism is rooted in his larger works on the development of modern society from the French Revolution onwards (Hobsbawm, 1996a;1996b;1996c;1996d). He comments directly on the historical circumstances that I examine in this dissertation. He is also the only modernist theorist that I surveyed to comment directly on debates held at Quetelet's early statistical congresses (see Hobsbawm, 1979, 97-98).

Prince and the power system described by Foucault when he develops his concept of governmentality. In contrast to feudalism, nationalism constructs a *different rhetoric* of political power through the notion of popular sovereignty or the liberal notion that the legitimate political rule should be based on the will of the collective body of the nation - the people inhabiting a specific territory who share a common culture and language - and not the body of a monarch (Kedourie, 1993; Greenfield, 1992). This is slightly *different* from the way that nationalism is discussed in contemporary historical periods where the nation-state system of political power had been established and nationalism is seen only as an isomorphism between people, language, culture and territory *without political alternative*. Hobsbawm (1979), for instance, remarks on the differences between historical and contemporary national movements cautioning against readings that impose current-day understandings of nationalism on historical ones. He explicitly states,

[w]e cannot therefore read into the revolutionary 'nation' anything like the later nationalist programme of establishing nation-states for bodies defined in terms of the criteria so hotly debated by the 19th century theorists, such as ethnicity, common language, religion, territory and common historical memories (20).

Both Gellner (1982; 2008) and Hobsbawm (1979) demonstrate that the notion of popular sovereignty – central to national movements during this period – was not an accurate reflection of the origin of national movements. During this period, they point to any number of potential social groups who clearly fit the definition of a nation but whose nation-states did not materialize during the 19th century. Examples include the Tamils, the Kurds and the colonial subjects of European empire (Hobsbawm, 1979). Further, they note that many nation-states that did emerge during the 18th and 19th centuries did not meet the definition of a nation as a united people sharing a common culture and language. For example, the nation-state of France *did not share* a common language, culture or territory before the revolution as was the case for many European nations during this period (Hobsbawm, 1979; Gellner, 1983).

Instead, these theorists claim that the political rhetoric of nationalism was necessary to invent the nation-state where a common people united by language, culture and territory did not exist. Gellner (1983), for instance, states:

Nations as a natural, God-given way of classifying men, as an inherent though long-delayed political destiny, are a myth; nationalism, which sometimes takes pre-existing cultures and turns them into nations, sometimes invents them, and often obliterates pre-existing cultures: that is a reality, for better or worse, and in general an inescapable one (48-49).

For the modernists, nationalism is, therefore, *not* literally ‘the will’ or ‘self-realization of the autonomous will of the people’ (however defined) upon which the nation-state emerges. It is just a claim intended to mobilize people and monopolize resources. It *invents* rather than *reflects* the nation.

As a result, European nationalism during the revolutionary period is better viewed as a state-imposed political rhetoric and culture, the invention of already powerful states who hoped to expand their political and economic power through conquest, colonization and social homogenization. Hobsbawm (1979) aligns the national project during the period between 1830 to 1880 with the liberal political ideology and bourgeois class. He claims this was “because the nation itself was historically novel, it was opposed by conservatives and traditionalists and therefore attracted their opponents” (Hobsbawm, 1979,40). During this period, he argues that the nation-states which emerged all had the following features: 1) a “historic association with a current state or one with a fairly lengthy and recent past”; 2) “existence of a long-established cultural elite, possessing a written national literary and administrative vernacular...”; 3) “...a proven capacity for conquest” (1979, 34) which is particularly evident in the project of colonialism. He argues that nationalism was a political rhetoric necessary to gain the loyalty of everyday people because prior to the French Revolution, it was not necessarily required as it was ensured through a variety of rigid social mechanisms that were local in scale (i.e. religion, local social hierarchy related to labour and access to materials for social reproduction). The potency of these traditional mechanisms was undermined by the French Revolution, and by the 1880s, mass democratization (however unsuccessful in practice) had made it obvious that the average person’s loyalty to the state was not automatic but required active cultivation. Rousseau’s “alternative ‘civic religion’ had to be constructed” (Hobsbawm, 1979, 269) because the everyday person’s loyalty was important both for the purposes of tax collection and war conscription (Hobsbawm, 1979, 83). Without it, the burgeoning nation-state as a political form of organization risked failure. This loyalty was secured and promulgated through “the *standardization of administration* and law within it, and in particular, state education” which “transformed people into citizens of a specific country’ (my italics, Hobsbawm, 1983, 265). Tilly (1990) further elaborates on the mechanism that resulted in different types of European state-rule over time which he suggests is best understood along a spectrum between capital and coercion. He defines capital as

any tangible mobile resources, and enforceable claims on such resources. Capitalists, then, are people who specialize in the accumulation, purchase and sale of capital. They occupy the realm of exploitation, where the relations of production and exchange themselves yield surpluses, and capitalists capture them (Tilly, 1990, 17).

Capital tends to concentrate in urban regions and promotes a class structure that privileges merchants, financiers and entrepreneurs. Conversely,

[c]oercion includes all concerted application, threatened or actual, of action that commonly causes loss or damage to the persons or possessions of individuals or groups who are aware of both the action and potential damage...The means of coercion centre on armed force, but extend to facilities for incarceration, expropriation, humiliation and publication of threats (Tilly, 1990, 19).

Coercion concentrates in rural areas and promotes a class structure that privileges landlords and soldiers.

The basic idea is that as leaders monopolize control of resources (arms, money, food resources, etc.) in order to impose consistent rule, defend or expand their territories, the structure of each state varies significantly depending on the balance between coercion and capital - “various combinations of capital and coercion produced very different kind of states” (Tilly, 1990, 17).

One of the major pathways used to unite disparate peoples culturally into nations was what Hobsbawm and Ranger (2012) call the “invention of national traditions”, understood as

a set of practices, normally, governed by overtly or tacitly accepted rules and of a ritual or symbolic nature, which seek to inculcate certain values and norms of behaviour by repetition, which automatically implies continuity with the past (1).

Hobsbawm (1983) identifies three types of invented tradition:

- a) those establishing or symbolizing social cohesion or the membership of groups, real or artificial communities; b) those establishing or legitimizing institutions, status or relations of authority, and c) those whose main purpose was socialization, the inculcation of beliefs, values systems and conventions of behaviour (9-10).

Similarly, Deutsch's (1953) definition of nationalism puts similar emphasis on its historically-invented nature but instead focuses on the mechanisms used to communicate national cultural ideals. He argues that nationalism is “based on the *community of communication* consisting of *socially stereotyped patterns of behaviour*, including habits of language and thought, and carried on through various forms of social learning” (21). His work on nationalism is based around understanding and, more importantly, mapping the constellations of *communication or*

incorporation technologies that create national communities. His definition is influenced by the Irish philosopher, Edmund Burke (1729-1797), who stated: “The idea of a people is the idea of a corporation. It is wholly artificial, and made, like all other fiction, by common agreement” (quoted in Deutsch, 1953, 7). In order to understand the process of national ‘corporation’ or making of a social body, Deutsch’s (1953) idea of nationalism is built on the interaction between the available *communications technology* and *social institutions*. While technologies do not necessarily determine social institutions, they do exist in a mutually constitutive relationship with one another.

Benedict Anderson (2006), a political scientist and historian who specialized in Southeast Asian studies, draws heavily on Deutsch’s (1953) idea of nationalism. His work extends Deutsch’s project by examining the *specific* communication and knowledge-generating technique that allowed national cultures or “imagined communities” to develop. Like Gellner (1983) and Hobsbawm (1979; 1983), Anderson (2006) argues that nationalism emerges in the wake of the decline of the religious-monarchical system in Europe, which he argues accelerated around the 17th century (17-18). However, unlike both Gellner (1982; 2008) and Hobsbawm’s (1979) analyses, which stress the demands of an increasingly divided economic structure as the driving force behind nationalism and the formation of the nation-state, Anderson’s (2006) analysis follows Deutsch (1953) and focuses on the pathways that enabled the spread of nationalism including: 1) increasing literacy and novel literary forms in non-Latin vernaculars driven by the printing press, the Reformation and Protestantism; 2) the generation of new literary markets exploited by early the capitalist system and 3) other knowledge-dissemination technologies such as maps and museums. As an important contextual note, Anderson’s analysis relates to events that occurred in the 16th and 17th centuries. All of these developments took place *before* mass primary education was made mandatory which was mostly a 19th century and, in some cases, early 20th century phenomenon¹² (Zinkina, Korotayev and Adreev, 2016).

Anderson (2006) notes that during the 17th century under the religious-monarchical system, the vast majority of people were illiterate and unable to access religious texts. He argues that mass illiteracy resulted in a social structure that was extremely bounded and hierarchical because a small group of literate priests (or priestly classes like Brahmins and so on) were the only people who

¹² The first state to introduce compulsory primary education was Prussia in 1763 followed by Denmark (1814), Greece (1834) and Spain (1838). France only introduced compulsory primary education in 1882 and Great Britain in 1880 (Zinkina, Korotayev and Adreev, 2016, 66).

could read holy texts making them mediators between earth and the divine (1982, 14-15). These religious orders supported monarchical, lineage-based systems of political power by arguing that the reigning Monarch was Divinely ordained (1982, 19). Anderson (2006) then suggests that the increasing literacy of the masses along with the emergence of non-Latin, print vernacular languages laid the basis for nationalism in three ways: 1) creating a new field of communication that was below Latin but above spoken vernaculars; 2) standardizing print languages; 3) privileging of the dialects closest to print languages creating “languages-of-power” (Anderson, 2006, 44-45).

As mass literacy increased, new literary forms such as the novel and newspaper became popular. These literary forms became important venues for the cultivation of national imaginations. The novel did this by following “the movement of a solitary hero through a sociological landscape of a fixity that fuses the world inside the novel with the world outside” (Anderson, 2006, 30). Similarly, newspapers began to cultivate the national imagination through the “inclusion and juxtaposition” of various unrelated news items, creating linkages between national characters (Anderson, 2006, 35). Anderson (2006) argues that the reading of the newspaper became a kind of national, daily mass ceremony like prayer, allowing people in far off places to be united around the same narrative of events. Anderson (2006) also contends that the increase in vernacular novels should also be understood as a function of early capitalist enterprise (37). Whereas the market for books written in Latin for an ecclesiastical audience was limited, mass markets for print vernaculars were larger and growing - encouraging the formation of printers from all over Europe (38).

Statistics as administrative vernacular

Anderson (2006), Deutsch (1953) and Hobsbawm (1979) all examine a multitude of different *techniques* of national corporation including spoken and written vernaculars, different forms of print media, map making and so on that were used to conjure national imaginations into existence. This literature includes a very limited discussion of the 19th century statistics developed during this period (Anderson, 2006; Hobsbawm, 1979; Gellner, 1983). Hobsbawm (1979), for instance, very briefly mentions statistics in his work and discusses them only as an illustration of the

limitations of 19th-century census categories through the standardization of national languages (1979, 96-97). Anderson (2006) introduces the concept of *quantification* into his discussion of national knowledge-generating techniques. He understands *quantification* as one of the various technologies (ex: newspaper, language, museums, censuses, map) through which nationalism is imagined. Specifically, in an analysis of Malaysian census categories in the late 19th century, Anderson (2006) argues that the use of *quantification* (as opposed to *categorization*) produced a significant change in the practice of census taking such that:

the real innovation of the census-takers of the 1870s was, therefore, not in the construction of ethnic-racial *classifications*, but rather in their systematic *quantification*. Precolonial rulers in the Malayo-Javanese world had attempted enumerations of the populations under their control... But after 1850 colonial authorities were using increasingly sophisticated administrative means to enumerate populations, including the women and children, according to a maze of grids which had no immediate financial or military purpose (168-169).

Yet Anderson (2006) appears to understand quantification only as the aspiration for a complete enumeration of *all people* in a given territory, even the ones who were not viewed as serving a military or economic purpose. I contend that he understands statistics only as a form of population counting or list-making and not as a form of quantitative manipulation using mathematical technique. He does not theorize statistical indicators, nor does he examine the complicated administrative processes behind them. This is a missed opportunity given Anderson's (2006) focus on the "spread of particular vernaculars as instruments of administrative centralization" (40) that created "*privileged access to ontological truth*" about the nation (my italics, 2006, 36). Nineteenth-century statistics should be conceived as *a* privileged administrative language of the nation, if not the most privileged and "objective" language given the high esteem accorded to numbers.

B) Foucauldian literature on governmentality

Another prominent theoretical lens for understanding the construction of national populations during the modern period is that of *governmentality*. These ideas were originally proposed by French philosopher, Michel Foucault (1926-1984) in his later 1977-78 *Collège de France* lectures and *History of Sexuality* (1978). Foucault's idea of governmentality has been used as an analytical framework to understand the historic and current role of statistics in the governance of the nation-

state (see Porter, 1995; Patriarca, 1996; Cole, 2000; Hacking, 2013; Lascoumes and Le Gales, 2005). Although I am not going to use a Foucauldian framework for my own study, it is a very popular framework for discussing the political uses of statistics. In this section, I briefly explain Foucault's concept of governmentality and show how it has been used to understand the use of statistics by 19th and 20th century nation-states. I then discuss the limitations of this framework for understanding the use of statistics by 19th century nation-states.

Foucault invents the concept of “*gouvernementalité*” (111) or *governmentality* in his *Collège de France* lecture given on February 1, 1978. Governmentality emerged as a response to the question, « *Comment se gouverner, comment être gouverner, comment gouverner les autres, par qui doit-on accepter d'être gouverné, comment faire pour être le meilleur gouverneur possible?* » (p.93). Foucault notes that the 19th century marked a resurgence of academic interest in the 16th century work on sovereign power, *The Prince* by Niccolò Machiavelli. He argues that an entire 19th-century literature *critiqued* Machiavelli's analysis of the sovereign, power, and the art of governance which he refers to as the “anti-Machiavellian literature” (Foucault, 2004, 93-94). Foucault (2004) argues that this resurgence of interest in Machiavelli's work emerged because it served as an intellectual “*point de repulsion*” (93) for broader thinking on the nature of sovereignty and the workings of political power which, he argues, were in a state of flux at that time.

He suggests that these 19th century critiques of Machiavelli's *Prince* marked the culmination of a shift in ideas about the practical exercise of power that had been ongoing from the 16th century, beginning with early modern thinkers like Guillaume de La Perrière (1499/1503-1593) and manifesting practically in the 18th and 19th century in the French mercantilist (16-18th centuries) and the German cameralist¹³ (16 - 19th centuries) movements. He argues that this transition was brought about by two major factors: 1) the decline of the feudal system in favour of “*les grands États territoriaux, administratifs, coloniaux*” and 2) a reconsideration of the legitimate or effective justifications for the governance of populations brought about by the questioning of the Church and Divine power initiated by the Reformation and Counter-Reformation (Foucault, 2004, 92).

¹³ The German cameralist movement was a specific political and economic approach used in the German territory during the 17th and 18th centuries with similar features to the French mercantilist movement (Salter, 2016; Backhaus & Wagner, 1987).

In particular, Foucault argues that the shift in governance was coupled with 1) a change in the importance of the conception and operation of the ‘economy’ and 2) the invention of ‘population’ as the object of governance/power through the knowledge-generating technique of statistics. Until this point, Foucault claims that the concept of ‘the economy’ was exclusively tied to the governance of the family and the home, a meaning he illustrates with Rousseau’s historical definition of economy as the “*le sage gouvernement de la maison pour le bien commun de toute la famille*”¹⁴ (98). Foucault suggests a shift in the 18th century when ‘the economy’ becomes “*un champ d’intervention pour le gouvernement*” (99).

Treatment of statistics in the Foucauldian literature

In Foucault’s framing, statistics was *the* knowledge-generating technique, “*le facteur technique principal*” (107), that made the population the new focus of governmental action. Following the shift towards a capitalist economy, the population replaces the family and transforms the notion of economy from the management of the family to the management of the population (107).

*La population apparaît donc, plutôt que la puissance du souverain, comme la fin et l’instrument du gouvernement: sujet de besoins, d’aspirations, mais aussi objet entre les mains du gouvernement. [Elle apparaît] comme consciente, en face du gouvernement, de ce qu’elle veut et inconsciente, aussi, de ce qu’on lui fait faire. L’intérêt comme conscience de chacun des individus constituant la population et l’intérêt comme intérêt de la population, quels que soient les intérêts et aspirations individuels de ceux qui la composent, c’est cela qui va être, dans son équivoque, la cible et l’instrument fondamental du gouvernement des populations*¹⁵(109).

Why is the knowledge-generating technique of statistics so essential for this transformation?

En effet, cette statistique qui avait fonctionné jusque-là à l’intérieur des cadres administratifs et, donc, du fonctionnement de la souveraineté, cette même statistique découverte et montre peu à peu que la population a ses régularités propres: son nombres de morts, son nombre de malades, ses régularités d’accidents. La statistique montre également que la population comporte des effets propres à son agrégation et que ces phénomènes sont irréductibles à ceux de la famille: ça va être les grandes épidémies, les expansions endémiques, la spirale du travail et de la richesse. La statistique montre [encore] que, par ses déplacements, par ses manières de faire, par son activité, la

¹⁴ Translation: The wise government of the family for the common good of all the family.

¹⁵ Translation: The population appears, therefore, more than the power of the sovereign as the end and means of government; subject of needs, aspirations, but also the object between the hands of the government. It appears as conscious, in front of the government, of what it wants and unconscious, too, of what it is being made to do. Interest as conscious of each individual constituting the population and interest as an interest of the population, whatever the individual interests and aspirations of the people that compose it, this is what will be, in its equivocation, the target and fundamental instrument of the government of populations.

*population a des effets économiques spécifiques. La statistique, permettant de quantifier les phénomènes propres à la population, en fait apparaître la spécificité irréductible [au] petit cadre de la famille*¹⁶ (my bold, 2004, 107-108).

Governmentality is the new 19th-century approach to the ‘problems of population’ that are constructed through the knowledge-generating technique of statistics. Foucault defines his idea of governmentality in three ways, which I will quote at length given the tremendous influence of this concept and vigorous debate around its uptake in the English literature (Rose, 1999; Osbourne and Rose, 1997):

*Par ‘gouvernementalité’, j’entends l’ensemble constitué par les institutions, les procédures, analyses et réflexions, les calculs et les tactiques qui permettent d’exercer cette forme bien spécifique, quoique très complexe, de pouvoir qui a pour cible principale la population, pour forme majeure de savoir l’économie politique, pour instrument technique essentiel les dispositifs de sécurité. Deuxièmement, par ‘gouvernementalité’, j’entends la tendance, la ligne de force qui, dans tout l’Occident, n’a pas cessé de conduire, et depuis fort longtemps, vers la prééminence de ce type de pouvoir qu’on peut appeler le ‘gouvernement sur tous les autres: souveraineté, discipline, et qui a amené, d’une part, le développement de toute une série d’appareils spécifiques de gouvernement [et, d’autre part], le développement de toute une série de savoirs. Enfin, par ‘gouvernementalité’, je crois qu’il faudrait entendre le processus, ou plutôt le résultat du processus par lequel l’État de justice du Moyen Âge, devenu aux XVe et XVIe siècles État administratif, s’est trouvé petit à petit ‘gouvernementalisé’*¹⁷ (Foucault, 2004, 111-112).

It is important to emphasize again that Foucault is arguing that governmentality is only made possible through the knowledge-generating technique of statistics *because* it is the knowledge-

¹⁶ Effectively, the statistics that had functioned up until that point inside administrative executives and, therefore, the functioning of sovereignty, this same statistics discovers and shows little by little that the population has its regularities: its numerous deaths, its numerous diseases, its regular accidents. Statistics equally shows that the population includes effects that are specific to its aggregation and that these phenomena are irreducible to those of the family; that would be large epidemics, endemic expansions, the work cycle and wealth. Statistics shows [also] that, by its movements, its ways of doing, by its activity, the population has specific economic effects. Statistics, by allowing for the quantification of phenomena specific to the population, makes appear the irreducible specificity to the framework of the family.

¹⁷ Translation: By governmentality, I mean the ensemble constituted by institutions, procedures, analyses and reflections, the calculations and tactics that permit the exercise of this specific, albeit very complex, form of power that has for its principle target the population, as a major form to political economic knowledge, as an essential dispositive of security. Secondly, by governmentality, I mean the tendency, the main elements that, in all of the Occident, have long driven to prominence this type of power that we can call ‘government above all others: sovereignty, discipline, and that has brought, on one hand, the development of an entire series of government apparatuses, and, on the other hand, the development of an entire series of knowledges. Finally, by governmentality, I think that we should understand the process or, more specifically, the result of the process by which the State of justice of the Middle Ages, became in the XV and XVI centuries the administrative state, found itself little by little ‘governmentalized’.

generating technique used to construct population aggregates. It is only through these aggregates (averages, deviations, etc.) produced by statistics that ‘the population’ can be known, enabling population-level government interventions (2004, 108).

Yet despite Foucault’s emphasis on statistics as *the* knowledge-generating technique of population, his inquiry focuses on understanding *the function or outcome* of this knowledge-generating technique as part of a larger *technology* of security and not on the specifics of techniques themselves. While he argues that one could write a history of the technique of statistics, it is the larger technology of security that he privileges as the more interesting phenomena deserving of inquiry. The point of his analysis, according to Foucault is

*à essayer de dégager les relations de pouvoir par rapport à l’institution, pour les analyser [sous l’angle] des technologies, les dégager aussi par rapport à la fonction, pour les reprendre dans une analyse stratégique, et les déprendre par rapport au privilège de l’objet pour essayer de les replacer du point de vue de la constitution des champs, domaines et objets de savoir*¹⁸ (Foucault, 2004, 122).

In addition to Foucault’s work, a small historical literature has emerged that explicitly engages Foucault’s idea of governmentality to understand the role of statistics in the construction of 19th century national populations (ex: Porter, 1995; Patriarca, 1996; Hacking, 1991; Lascombes and Le Galès, 2004; Rose, 1999; Osbourne and Rose, 1997; Cole, 2000). Here I develop some of the ways that these thinkers have used and critiqued Foucault’s idea of governmentality and its connection to statistics.

Ian Hacking’s (1991) discussion of the ‘doing’ of the history of statistics is probably the clearest and most mathematically-informed application of Foucault’s idea of governmentality to the history of statistics. Hacking (1991) – a mathematician and philosopher by training – integrates Foucault’s *governmentality* into a detailed discussion of the history of probability and statistics, with a particular emphasis on understanding the historical development and political applications of statistical techniques. He continues Foucault’s critique of 19th century liberal political institutions and philosophies by connecting them to the practice of statistics (Hacking, 1991).

The fundamental principle of the original moral sciences was the Benthamite one: ‘the greatest happiness to the greatest number’. It was necessary to count men and women and

¹⁸ Translation: trying to disentangle the relations of power with respect to the institution, so that he can analyse these relations through the lens of technologies, and to disentangle them as well with respect to their function, to include them in a strategic analysis, and separate them from the privilege of the object to try to try to replace them from the point of view of the constitution of the fields, domains and objects of knowledge.

to measure not so much their happiness as their unhappiness: their morality, their criminality, their prostitution, their divorces, their hygiene, their rate of conviction in the courts. With the advent of laws of statistics, one would find the laws of love, or if not that, at least the regularities about deviancy.... The bureaucracy of statistics imposes not just by creating administrative rulings but by determining classifications within which people must think of themselves and of the actions that are open to them (Hacking, 1991, 194).

Hacking's (1991) use of the concept of governmentality is illuminating. His connection of the use of statistics to prominent political theories of the 19th century is a clear extension of Foucault's work bolstered by his excellent understanding of statistical history. His essay, "How should we do the history of statistics?" contains a sketch of the key periods of statistical history that was instrumental to this dissertation (1991).

Hacking's work tends to approach statistics from two different vantages. First, he seeks to describe and understand the ways that political uses of statistics change over time (see, for example, Hacking, 1987b; Hacking, 1991). Second, he writes about statistics from a philosophical and mathematical perspective to formally identify both the logical premises of statistical practice and to understand the dramatic epistemological shifts that occurred in the 20th century as statistics transitioned from a deterministic program of study intended to reveal natural law to an indeterministic one (See, for example, Hacking, 1987a; Hacking, 1965). Similar to Foucault, Hacking's work on the political uses of statistics tends to focus on statistics writ large. Although he certainly could, Hacking does not interrogate the specifics of the statistical process. Questions examining the minutiae of the statistical process (i.e. How were 19th-century statistical bureaucracies conceived and organized? Which social categories were used? How were they determined and standardized?) are not extensively addressed by his analysis which opts instead to focus on broader philosophical themes.

The concept of governmentality is also used by Theodore Porter (1986; 1995) to understand the standardization of social measurement systems in the 19th and 20th centuries that occurred in tandem with the standardization of state administrations. At the heart of Porter's argument lies the idea that "science [both natural and social] as we know it depends on the administration of nature, a stunning social achievement" (22). Following Foucault, he argues that "the centralizing state and large-scale economic institutions" led to the practice of a new kind of knowledge-generating that "aspired to independence from local customs and local knowledge" (22). The project of both physical and social science during this period, for Porter (1986; 1995), was also a project of

administrative centralization whereby the “bureaucratic imposition of uniform standards and measures [was] indispensable for the metamorphosis of local skills into generally valid scientific knowledge” (1995, 22). The centralizing state sought to standardize measurement practices not only through the imposition of the metric system but also through the generation of social categories used to define groups and the practices used to interpret them. In this way, Porter argues that the credibility of numbers became both a “social and moral problem” (1998, 11) that was an important new component of Europe governance (both in Europe and colonized places) during the 19th century (1998, 14).

Porter (1995) argues that the extensive organization required to implement these new measurement systems “help[ed] to move the economy away from an order of privilege into the domain of law” (25-26). (Obviously this shift was largely rhetorical and there are a variety of ways that privilege remained articulated through law.) This system saw the collaboration of prominent thinkers, like Condorcet and Laplace, with the state, resulting in the introduction of various governmental bureaus of standards that saw “the collaboration of science, government and industry” (1995, 27). These bureaus

provid[ed] legitimacy for administrative action, in large part because they provide standards against which people judge themselves... they measure success by giving direction to the very activities that are being measured. In this way individuals are made governable... (Porter, 1995, 45)

Porter (1995) connects Foucault’s governmentality to his analysis by suggesting that the quantification of human action was an important vehicle for the imposition of social norms:

Grades in school, scores on standardized examinations, and the bottom line on an accounting sheet cannot work effectively unless their validity, or at least reasonableness, is accepted by the people whose accomplishments or worth they purport to measure. When it is, the measures succeed by giving direction to the very activities that are being measured. In this way individuals are made governable; they display what Foucault called governmentality. Numbers create and can be compared with norms, which are among the gentlest and yet most pervasive forms of power in modern democracies (Porter, 1995, 45).

Porter’s (1995) observation that statistics play an important role in constituting the groups they hope to describe is supported by Patriarca’s (1996) excellent work on Italy during the same period. She argues that Italian statistics “not only performed a work of ideological and political legitimization, but also contributed to the creation, the ‘production’ as it were, of the Italian nation” (1996, 4).

Cole (2000) further extends this idea to ambitiously suggest that the idea of “the social sphere” or the idea of society itself used by the social sciences emerged alongside the use of statistics.

The social realm emerged as the arena for exploring the causal relationships that operated within populations. Such causal relationships could be internal, resulting from the activities of individual members of the population and their behaviour towards one another; they could also be external, the result of environmental or historical influences. The idea that one could not only count inhabitants but measure the effects of both internal and external dynamics of population through quantitative analysis simply did not exist before the end of the 17th century (11).

While it is clear that Foucault’s idea of *governmentality* is important for studies of the political uses of statistics and has given rise to a number of insightful observations by a variety of thinkers (including mathematicians); however, Foucault’s framework is not the only one that can or has been used to understand the use of statistics to govern. Cole (2000), for example, who uses governmentality and Foucauldian ideas to develop his analysis, cautions against an *overreliance* on Foucauldian frameworks for understanding the relation between politics and statistics. He characterizes Foucault’s ideas as “simultaneously seductive, useful and potentially misleading” (8) because they “can slip quickly into reductive or excessively monolithic characterizations of an extremely complex and, at times, even contradictory history” (8). Writing about early identification techniques and documents used by European state apparatuses¹⁹, Torpey (2018) also remarks on the limitations of Foucault’s concept: “Foucault’s considerations of these matters [governmentality] *lack any precise discussion of the techniques of identification* that have played a crucial role in the development of modern, territorial states resting on distinctions between citizens/nationals and aliens” (my italics, p.7).

Despite the heavy weight that Foucault gives to statistics as *the* knowledge-generating *technique* involved in the transition towards economic and population thinking, his analytical emphasis is always on the broader *technology* of security. He specifically indicates this analytical choice early on in the 77/78 lecture series where he develops the idea of governmentality. Using the example of statistics, Foucault justifies his analytical choice in the following way:

Autrement dit, vous allez avoir une histoire qui va être une histoire des techniques proprement dites. ... Vous pourriez faire aussi l’analyse de cette technique, alors de sécurité, qui serait par exemple la statistique des crimes. La statistique des crimes est quelque chose qui ne date pas d’aujourd’hui, ce n’est pas non plus quelque chose de très

¹⁹ Translation: A system linked directly to list-making because it relies on the standardization of naming systems and other characteristics by state apparatuses for the purposes of public administration.

ancien. En France, ce sont les fameux Comptes du ministère de la Justice à partir de 1826 qui permettent la statistique des crimes. Donc, vous pouvez faire l'histoire de ces techniques. Mais il y a une autre histoire, qui serait l'histoire des technologies, c'est-à-dire l'histoire beaucoup plus globale, mais bien entendu également beaucoup plus floue des corrélations et des systèmes de dominante qui font que, dans une société donnée et pour tel et tel secteur donnéDonc ce que je voudrais essayer de vous montrer au cours de cette année, c'est en quoi consiste cette technologie, quelques-unes de ces technologies [de sécurité], étant entendu que chacune d'entre elles consiste pour une large part en la réactivation et la transformation des technique juridico-légales et des techniques disciplinaire dont je vous avais parlé les années précédentes²⁰. (my bold, Foucault, 2004, 10-11).

The point here is not that statistics is not interesting or influential; Foucault states multiple times that statistics is *the* knowledge-generating technique behind population thinking. Rather, the point is that for Foucault statistics is a technique and techniques are compatible with different constellations of power. Foucault's inquiry seeks to examine broader technologies, not techniques. A detailed examination of the statistical techniques themselves is simply not central to his inquiry nor is it present in his work – an observation made by multiple scholars who have discussed his idea of governmentality and one that I echo in this dissertation.

THEORIZING STATISTICS IN POLITICS: STS LITERATURE AND DESROSIERES' HISTORICAL SOCIOLOGY OF QUANTIFICATION

Foucault is clearly a formidable thinker, but he is not the only thinker to have theorized a role for statistics in political organization. If statistics is *the* knowledge-generating technique behind population thinking, a recognition of the *multitude of techniques* historically included under this label during the 19th century when the transition to governmentality was occurring is essential. As already noted, the discipline of statistics *itself* was undergoing very significant changes during the 19th-century as it transitioned from the qualitative study of the state to academic stream of applied

²⁰ Translation: Otherwise said, you will have a history that will be the history of techniques themselves.... You could also do an analysis of this technique, for example security, that would be, for example criminal statistics. Criminal statistics are neither new nor particularly old. In France, it was the famous Accounts of the Ministry of Justice from 1826 that allowed for criminal statistics. So, you could do a history of these techniques. But there is also another history, that is the history of technologies, that is to say, a history that is much more global, but also much more undefined history of the correlations and systems of domination that, in a given society and sector... So, what I would like to try to show you over the course of this year, is what this technology [of security] consists of, understanding that each of them consists largely of a reactivation and transformation of juridico-legal and disciplinary techniques that about which I spoke last year.

mathematics (Porter, 1995; Stigler, 1999; Hacking, 1991). During the nineteenth century, the range of practices included under the disciplinary label ‘statistics’ could include anything from descriptions of the climate and topography to an early version of representative sampling. A more granular analysis of statistics at the level of technique is, therefore, particularly important for historical discussions because statistics as a discipline was changing so dramatically during this period. A more detailed approach that focuses on *technique* as opposed to *technology* is important because *one cannot assume that the 19th-century practice of statistics was exclusively quantitative*. In this section, I expand on Alain Desrosières’ ideas in conversation with other STS scholars.

Alain Desrosières (1940-2013) was both a statistician and sociologist who specialized in STS studies. A contemporary and collaborator of Pierre Bourdieu, he was affiliated with the *Institut national de la statistique et des études économiques* (INSEE). His work, much of which was not translated into English, sought to theorize the historical and contemporary uses of statistics for political organization and population management. It is informed by an intimate knowledge and experience of the practice of statistics by nation-states. Desrosières (2008a) observes that, « pour le sociologue et l’historien des rapports entre sciences et sociétés, la statistique est un objet original ²¹» (2008a, 7). This is because « *l’argument statistique est toujours tendu entre une rhétorique (politique) de la décision et de la justification, et une rhétorique (scientifique) de la vérité et de la preuve* ²²» (my bold, 2008a, 116). As a result, he argues that historical research on the history of statistics falls into two distinct sociological domains - *political sociology* and the STS field (114). These different literatures may discuss the same figures and elements of the same history, but they tend to characterize the practice of statistics in very different ways because of its dual role as a *political rhetoric* and a *knowledge-generating practice*.

Within *political sociology*, « *l’accent est mis sur la capacité de bureaux de statistiques et des méthodes quantitatives à instaurer une forme épuisante d’objectivité, socialement construite, et fondé sur la ‘confiance dans les nombres’* ²³» (Desrosières, 2008a, 114). Foucault’s work discussed above best exemplifies this tendency because it does not dissect the practice of statistics at all and instead focuses its discussion on the political object that statistics constructs (population)

²¹ Translation: For the sociologist and historian of relations between science and society, statistics is an original object.

²² Translation: ... the statistical argument is always stretched between a (political) rhetoric of decision and justification and a (scientific) rhetoric of truth and evidence.

²³ Translation: ...the emphasis is put on the capacity for statistical bureaus and quantitative methods to establish a powerful form of objectivity, socially constructed, and founded on ‘confidence in numbers’

and the type of political interventions statistics enables (governmentality). Within an STS framework, statistics is viewed at the level of technique and theorized as a social and historical phenomenon that «*suit l'évolution des formulations et des usages des schémas probabilistiques*»²⁴ (Desrosières, 2008a, 114). It suggests that “scientific knowledge itself had to be understood as a social product” (Pickering, 1993, 1) and is, therefore, the result of complex negotiation and consensus-building by communities of ‘experts’ (and also laypeople) (Pickering, 1993; Bowker and Star, 2000).

An STS framework recognizes the historical and social nature of academic disciplines themselves and the (sometimes) tremendous substantive changes that can occur within an academic discipline (Pickering, 1993; Bowker and Star, 2000; Heilbron, 2006). It understands statistical techniques and social metrics as historical knowledge-generating practices “produced by people with bodies, situated in time, space, culture, and society, and struggling for credibility and authority” (Shapin, 2010) and seeks to connect 1) “the historical circumstances in which [a scientific method] as a systematic means of generating natural knowledge arose”; 2) the processes by “which [scientific] practices became institutionalized”; and 3) the processes by which scientifically “produced matters of fact were made into the foundations of what counted as proper scientific knowledge” (Simon and Shapin, 1985, 1). The point of this exercise is not, as Latour (2005) observes, to unmask, denounce or rise above actors to view some deeper reality motivating their actions. As he observes, “yes, the scientific facts are indeed constructed, but they cannot be reduced to the social dimension because this dimension is populated by objects mobilized to construct it” (2005,7). Instead, Latour argues that the social is the series of associations that *should be explained by research* rather than a stable social aggregate *that exists behind every social occurrence, explaining all phenomena* (2005, 9). For Latour, the social is not a material that makes up reality, it is an *association* that needs to be studied, made visible by the traces it leaves (2007, 9): “to be social is no longer a safe and unproblematic property, it is a movement that may fail to trace any new connection and may fail to redesign any well-formed *assemblage*” (2007, 8). This is what I will do in this dissertation by examining the groups of people who developed statistical epistemology and techniques during the 19th century.

Within this framework, Desrosières’ (2008a) *historical sociology of quantification* draws from both the *political sociology* literature and the STS literature to connect the political uses of

²⁴ Translation: ...follows the evolution of formulations and the use of probabilistic schemas ..

statistics to the historical development of the statistical techniques themselves. His goal is to correct what he sees as an error in the practice of quantitative social science which, he argues, tends to treat the data and its quantitative interpretation as two separate phenomena²⁵: « *une fois les procédures de quantification codifiées et routinières, leurs produits sont réifiés. Ils tendent à devenir 'la 'réalité', par un effet de cliquet irréversible* » (Desrosières, 2014, 12).

*Le durcissement institutionnel est même une condition sine qua non de la fiabilité des statistiques: les polémiques récurrentes sur la mesure du chômage le démontrent tous les jours. Le développement du réseau statistique est lié à celui d'un système d'institutions. Cet investissement, analogue à celui d'un réseau routier ou ferroviaire, crée des catégories qui deviennent ensuite incontournables, le plus souvent différentes d'un pays à l'autre*²⁶ (2008, 155).

Instead, Desrosières' historical sociology of quantification encourages an alternate view:

[t]he public sphere is not only a sometimes vague performative idea, but a sphere that is historically and technically structured and limited. Statistical information did not fall from the sky like some pure reflection of a pre-existing 'reality' (Desrosières, 2002, 324-325).

As a result, a sociological and historical approach is necessary to describe the social processes, assumptions, routines and institutions that construct 'social data'. The central concept that Desrosières (2008a; 2010) uses to understand the statistical process is '*quantification*'. He defines *quantification* as that which "*exprime et fait exister sous une forme numérique ce qui, auparavant, était exprimé par des mots et non par des nombres*²⁷" (2014, 38). He chooses this term because it « *attire l'attention sur les dimensions, socialement et cognitivement créatrice, de cette activité. Celle-ci ne fournit pas seulement un reflet du monde (point de vue usuel), mais elle le transforme,*

²⁵ « La 'methodologie statistique' utilisée par les sciences sociales quantitatives est en général présentée en 2 parties bien distinctes, rarement reliées entre elles: d'une part, la construction des données, puis, d'autre part, leur traitement et leur interprétation. Souvent, entre ces 2 mondes, se dresse la 'banque de données', qui fonctionne comme un cas de passage de l'un à l'autre. Or le monde de la 'construction est lui-même tendu entre 2 façons de rendre compte de ses pratiques: la mesure, issue du langage des sciences de la nature, le codage conventionnel, inspiré, selon les cas, du droit, des sciences politiques, ou des sciences cognitives. Cette ambiguïté, caractéristique des sciences sociales quantitatives, peut être analysée à travers une mise en perspective historique, qui permet aussi de relier les questions soulevées par la construction des données à celles qui résultent de la diversité des modes d'analyse » (Desrosières, 2008a, 153).

²⁶ Translation: Institutional strengthening is a sine qua non condition of the reliability of statistics; the recurrent polemics on measures of unemployment demonstrates this everyday. The development of a statistical network that is linked to a system of institutions. This investment, analogous to that of a network of roads or railways, creates the categories that subsequently become inevitable, often different from one country to another.

²⁷ Translation: ...expresses and makes exist in a numerical form that which, before, was expressed by words and not by numbers

*en le reconfigurant autrement*²⁸» (2008a, 11). The general process of quantification is based on the establishment of *conventions of equivalence* between people, lists and techniques to such an extent that «*la construction d'un système statistique est inséparable de celle d'espaces d'équivalence*²⁹» (2008a, 77). These conventions of equivalence are established in a two-stage process: a) the *development of taxonomies* which Desrosières (2008a) understands as nomenclatures intended to be all-encompassing of any given phenomena generated from social convention and measurement techniques b) the establishment of *mathematical conventions of equivalence* used to interpret these taxonomies.

Through his notion of quantification, Desrosières (2008a) hopes to undermine what he sees as a tendency towards the reification of quantitative processes and their association with objectivity:

*L'hypothèse retenue ici est que la quantification, entendue comme l'ensemble formé des conventions socialement admises et des opérations de mesure, crée une nouvelle façon de penser, de représenter, d'exprimer le monde et d'agir sur lui. La question récurrente de savoir si une statistique 'reflète plus ou moins bien la réalité' est un raccourci trompeur, contaminé par le réalisme métrologique des sciences de la nature. La statistique, et plus généralement toutes les formes de quantification (par exemple probabiliste ou comptable), reconfigurent et transforment le monde, par leur existence même, par leur diffusion et leurs usages argumentatifs, que ceux-ci soient scientifiques, politiques ou journalistiques*³⁰ (Desrosières, 2008a, 11-12).

Below, I explain Desrosières' two-stage quantification process and enhance it with other theoretical observations on quantification that I believe are relevant. I do this because I am using Desrosières' historical sociology of quantification as the major theoretical framework for my dissertation. I am also doing this because I have structured the remaining chapters around his two-stage quantification process. In Chapter 3 and 4, I discuss the development of European list-making techniques by state apparatuses over time. This process roughly corresponds to the first stage of quantification. In Chapters 5 and 6, I expand my discussion of lists to include the

²⁸ Translation: ...draws attention to the creative social and cognitive dimensions of this activity. This does not only provide a reflection of the world (normal point of view), but it transforms and reconfigures it as well.

²⁹ Translation: ...the construction of a statistical system that is inseparable from that of spaces of equivalence

³⁰ Translation: The hypothesis retained here is that quantification, understood as the defined ensemble of applied social conventions and measurement operations, creates a new way of thinking, of representing, of expressing the world and of acting upon it. The recurrent question is if statistics 'reflects more or less the reality' is a misleading shortcut contaminated by the metrological realism of the natural sciences. Statistics, and more generally all forms of quantification (for example, probabilistic or accounting), reconfigure the world, by their very existence, by their diffusion and their argumentative use, whether scientific, political or journalistic.

epistemological arguments that were made to apply mathematical techniques to their interpretation. (I elaborate further on this in the methods section below.)

A: Quantification Stage 1: Construction of taxonomies

The first stage of the statistical process is not quantitative but *qualitative*, involving the development and application of standardized measurements to consistently categorize phenomena in discrete, one-word categories that exist along some spectrum of attributes.

*La première, issue plutôt du droit, de la vie administrative, de la médecine, construit des classes d'équivalence, des catégories, et affecte des cas singuliers à celles-ci, à travers des jugements, des décisions, des diagnostics ou des procédures de 'codage sociale'*³¹ (Desrosières, 2008a, 121).

Variables (i.e.: vocation) or discrete individual words encompassing some spectrum of attributes or categories (i.e.: primary, secondary and tertiary industry) are developed. These variables are then grouped into *taxonomies* that nest different variables into meaningful groups. In this first stage of the quantification process (the construction of variables and lists), there are some additional concepts that complement Desrosières' framework. The observation that statistics - any form of statistics - requires standardized conventions for the measurement of the phenomena being surveyed is not at all limited to the sociological literature. Although he writes from a very different orientation (logical positivism) and certainly privileges quantitative approaches, Carnap (1974), for instance, also stresses the centrality of standardized measurement *conventions* (and systematically applied *rules* governing these conventions) to the quantification process. He argues "it is important to understand that we cannot really say we know what we mean by any quantitative magnitude *until we have formulated rules for measuring it*" (my emphasis, 1974, 68). In both of these different frameworks, standardized measurement systems used to categorize phenomena into discrete one-word categories must exist *before* statistical analysis can be done. This, of course, makes intuitive sense, particularly in the field of social statistics. Standardized categories, derived from social conventions and practical work for categorizing the population into discrete categories must exist and be consistently according to some framework applied for statistics to claim any

³¹ Translation: The first is an issue of law, administrative and medicine, constructs classes of equivalence, categories and assigns singular cases to these, through judgements, decisions, diagnoses or procedures of 'social coding'.

correspondence to reality whatsoever. Without lists from which the frequencies of standardized social categories can be derived, statistics is absolutely meaningless, nothing more than an exercise in mathematical technique: garbage in, garbage out.

Bowker and Star (2000), writing from the computer science and STS perspective, also elaborate on the nature of classification systems and, like Desrosières (2008b), stress the importance of recognizing the tremendous work and social organization that is required to generate standardized social categories in population lists. They suggest that “there is more at stake – epistemologically, politically and ethically – *in the day-to-day work of building classification systems and producing and maintaining standards* than in abstract arguments and representation” (my italics, Bowker & Star, 2000, 10) and note a tendency for many scientific and technological systems to “collective[ly] forget” or *naturalize* the “contingent and historical circumstances of [their] birth” (299). The erasure of the “conditions of production” of scientific and technological knowledge, particularly the glossing over of the extraordinarily messy and, in some cases, highly discretionary work done to generate and maintain scientific and technological systems can give the impression that data furnished by these systems is somehow neutral, reflecting scientific consensus. Bowker and Star (2000) suggest that this oversight results in the “substitut[ion] of precision for validity” (24) or the belief that the precision of science and technological language is a successful guarantor of their correspondence to what is really going on – an observation shared by Poovey (1995) and other thinkers.

With the importance of “the conditions of production” in mind, Bowker and Star (2000) define classification systems as a “consistent, unique classificatory principles in operation” intended to generate “categories [that] are mutually exclusive” that purport to represent a complete system (2000, 10-11). Systems, particularly knowledge systems like social population lists, need to be standardized if they are going to be applied across large areas, otherwise, the knowledge that they generate is meaningless because the categories used are not comparable. Bowker and Star (2000) describe standardization as “any set of agreed-upon rules for the production of (textual or material) objects” that “span more than one community of practice” as well as temporal period. Standardization is “deployed in making things work together over distance and heterogenous metrics” (Bowker and Star, 2000, 13-14). They understand textual or material objects that are standardized or span more than one community of practice as ‘boundary objects’ or “those objects that both inhabit several communities of practice and satisfy the information requirements of each

of them” (16). For example, they understand the formation of the 19th century international classification of diseases

not [as] a record of gradually increasing consensus but a panoply of tangled and crisscrossing classification schemes held together by an increasingly harassed and sprawling international public health bureaucracy (Bowker and Star, 2000, 21).

Social statistics, both historically and currently, rely on categories that are meaningful to multiple social institutions who task individuals with the day-to-day work of *enumerating people* or things representing people (like hearths) based on social categories that are deemed meaningful to the state-apparatus for the purposes of human population management. This means an individual working within a social authority structure is told that part of their job is to walk about the world, find people (or things) in a certain geographic area, categorize those people or things according to some limited number of options and count the person based on that characteristic.

Desrosières (2008a) claims that this first part of the statistical process maps roughly onto the history of statistics, when the development of standardized nomenclature for describing the state and its members was the major goal of statistical practice, like Achenwall’s *Statistiks*. In the first part of this dissertation (Chapter 3), I follow Desrosières (2008a; 2008b) and examine selected historical European systems of standardized social nomenclature and use the secondary academic literature to describe the work that was done to generate them. I use this to show some of the early motivations for population categorization and counting as well as the historical list-making techniques that were used.

B: Quantification Stage 2: Establish mathematical conventions of equivalence

The second part of Desrosières’ quantification process involves establishing *conventions of equivalence* between the frequencies of categories derived from the lists and available mathematical techniques. This is done so that the mathematical techniques *can be used to manipulate the counts* and the statistical indicator or metric used to summarize the findings are *made meaningful for their interpretation* through *standardized interpretation conventions* agreed upon by expert communities (Desrosieres, 2008a, 80). Lorraine Daston (1988), a theorist who has written extensively on the history of probability, expresses this notion well when she states:

quantification depends on **some perceived analogy between subject matter and the available mathematics**...Quantification is thus a process of mutual accommodation between mathematics and subject matter to create and sustain analogies that make applications possible (Daston, 1988, x).

This second stage is both *epistemological* and *quantitative*. It uses *analogy* to justify the application of mathematical techniques to a given subject matter. For example, Chapter 4 of this dissertation will engage a detailed discussion of Pierre-Simon de Laplace's arguments for the centrality of analogy to the advancement of science which he used as part of his rationale for why Gauss' error curve could be applied to the study of the social sphere.

List-making and quantification are the processes by which Desrosières (2008a; 2008b) theorizes the nation is constructed and managed through social statistics. They are a key element of Weber's "rationalization" of the bureaucracy of the nation-state. Statistics is, therefore, not an objective scientific *reflection* of the nation but a *technique* of nation-building:

Dans ce cas, il est clair que la statistique ne se contente pas de "refléter" la réalité nationale, mais aussi l'"institue", au même titre que la Constitution, les fêtes nationales, les hymnes, les drapeaux, les manuels scolaires et les monuments historiques. Dans le cas de la statistique, l'acte politique fondateur n'est pas seulement l'exhibition d'un nombre (de préférence grand) comme celui de la population, ou plus tard celui du produit "national" brut, mais la convention d'équivalence permettant de compter et d'additionner. Le lien entre la démocratie (un homme, une voix) et la statistique est attesté par le fait que celle-ci est promue, dans l'Italie du Risorgimento, par des libéraux hostiles aux monarchies anciennes. Une nation n'est pas seulement un espace politiquement unifié, mais aussi un espace cognitif commun, observé et décrit à travers des grilles cohérentes. L'effort coûteux, long et souvent conflictuel, entrepris actuellement par les États de l'Union européenne pour « harmoniser » leurs systèmes statistiques, c'est-à-dire pour rapprocher des conventions d'équivalence hétérogènes parce que d'origines historiques souvent complètement différentes, le montre a contrario³² (Desrosières, 2008a, 26).

³² Translation: In this case, it is clear that statistics are not content to just 'reflect' national realities but also to 'institute' them, in the same fashion as Constitutions, national holidays, hymns, flags, scholarly manuals and historical monuments. In the case of statistics, the foundational political act is not just an exhibition of number (preferably large numbers) like that of the population, or later national gross product, but the conventions of equivalence allowing them to be counted and added. The link between democracy (one person, one voice) and statistics is attested by the fact that it is promoted, in the Italy of the Risorgimento, by liberals hostile to ancient monarchies. A nation is not only a unified political space but also a shared cognitive space, observed and described according to coherent tables. The costly effort, long and often conflictual, undertaken by the States of the European Union to 'harmonize' their statistical systems, that is to say bring together heterogeneous conventions of equivalence because the historical origins are often completely different, shows it conversely.

Desrosières (2008b) continues this line of thought with his reflections on statistical indicators and the political work done by them. Statistical indicators can include anything from population averages to murder rates to tuberculosis. Each statistical indicator is a political act and a potential social norm, suggesting institutional interest and action, conjuring into existence characteristics, standards, and phenomena previously unassociated with the nation-state. In this view, an analysis of specific statistical indicators is an important part of understanding the development of nationalism. Statistical techniques tell a story about the types of phenomena considered meaningful for the nation-state:

*Une histoire des indicateurs statistiques devrait donc être une histoire de l'émergence de tels objets: au début du XIXe siècle, le chômage ou la population active n'en faisaient pas partie, alors que, de nos jours, ils sont parmi les plus importants. **La question des indicateurs est liée à celle de l'action coordonnée et rationnelle d'institutions (l'Etat, puis, plus tard, des associations, des entreprises). L'indicateur est une phrase contenant des nombres justifiant et mettant en forme une action, ou un débat public à propos de celle-ci.** C'est parce qu'il y a une action, sur et dans la société, à mener, à coordonner ou à combattre, que des indicateurs sont produits et exhibés*³³ (my bold, Desrosières, 2008a, 193-194).

Desrosières (2008a) identifies several major periods in the historical use of statistics by nations – all associated with different styles of politics. Most relevant for this dissertation, the first period in national statistical history occurs roughly between 1800-1920. Likening statistics to the invention of national history, he observes that statistical bureaus became an indispensable part of the nation-state infrastructure from about 1830 onwards, prompted largely by the efforts of Adolphe Quetelet, the Astronomer Royale of Belgium, whom he characterizes as a figure central not just to the development of national statistics but international statistics as well (Desrosières, 2008a, 24). This dissertation examines the growth of international statistics by the IIS after Quetelet's death.

³³ Translation: A history of statistical indicators should therefore be a history of the emergence of such objects: at the beginning of the XIX century, unemployment or the active population were not a part of them, however, today, they are among some of the most important. The question of indicators is linked to that of the coordinated and rational action of institutions (the State, then later, business associations). The indicator is a sentence containing numbers justifying and shaping an action or a public debate about it. It is because there is an action, on and in society, to be carried out, coordinated or combatted, that indicators are products and exhibits.

Limitations of the Current Study

This dissertation presents several limitations and potential criticisms. Below, I try to identify the limits of this study, anticipate potential criticisms and offer justifications for my analytical choices.

1) Eurocentrism

The primary contribution of this work focuses on understanding how statistical techniques were developed by Pierre-Simon de Laplace, Adolphe Quetelet and the IIS in the 19th and early 20th century. I want to understand the analogies and assumptions that were made to justify the application of statistics to the description and management of nation-states. I chose this period and this geographic space because the secondary academic literature on the history of statistics suggests that many common statistical theories and techniques for understanding the social world were developed in this time and place. I chose the IIS as my primary, historical source because it is one of the first statistical journals to have been founded, it is international in scope and has not been analyzed extensively in the secondary literature allowing me to make a novel contribution. My inquiry is, therefore, limited to the topics and themes discussed by these works.

This, of course, does not mean that these are the only perspectives for understanding either probability theory or population counting practices nor am I suggesting that Europe holds an intellectual monopoly on statistical or mathematical practice. I have tried to “provincialize Europe” throughout this dissertation (Chakrabarty, 2000). From my vantage, this does not mean European contributions should be reduced or diminished but rather contextualized as one of many global intellectual centers where mathematical and social counting techniques were used. I think this approach allows me to recognize the global history of mathematics and social counting which has had various global centers of innovation over time that are obviously not at all exclusively European.

As a few very brief illustrations, the European notation system used to represent numbers is not European but derived from Hindu-Arabic representational system or the decimal system. This notational system was introduced to Europe in the 12th century from India and Arabic-speaking central Asia. Before this, the Roman numeral system was the most common mathematical notational system used in Europe. The Roman numeral system employs letters to represent quantity with no zeros or fractions (ex: MMXVIII). While Roman numerals were useful for simple arithmetical operations, it is not compatible with more advanced forms of math because it does not

have set places (or zero). The introduction of the Hindu-Arabic notational system - with its set places - allowed for the development of more complex forms of math like *algebra* - another Arabic import - which was not possible given the structure of the Roman numeral system.

Many of these ideas were developed by Al-Kwarizmi (الخوارزمي) or “the man of Kwarizim”. Kwarizim was a place located Central Asia, roughly in current-day Uzbekistan. Al-Kwarizmi was a very influential mathematician and is associated with the development of *algebra* - a term that he developed from the Arabic *al-jabr* (الجبر) - meaning ‘the reunion of broken parts’. Along with another Arab mathematician called *al-Kindi*, he is strongly associated with the promotion of the Hindu-Arabic decimal system to Europe and was responsible for introducing a number of important mathematical concepts to Europe as well.

In addition to the Arab mathematicians, various social counting techniques were also innovated in a variety of non-European places. As an example, both China and Japan had much stronger social census systems than Europe before the 19th century. The 19th-century French census project is explicitly modelled on the Chinese census model, which was much more advanced at the time (Dupaquier & Garden, 1988). Finally, it is important to note that the membership of the IIS and the topics discussed by it, even in the 19th century, was never exclusively European. Members came from Europe, Japan and Argentina and the geographic areas discussed are global in scope. The global coverage was, of course, related to the colonial project which was very active at the time. Indeed, European social counts and statistics were often an integral part of the administration of colonial territories and tended to be more developed in colonial territories leading into the 19th century as I will show in my later analysis in Chapter 6. I have recognized this by incorporating colonialism and the trans-Atlantic slave trade into the discussion when possible.

2) Note on terminology

This dissertation is an historical examination of the development of the field of European social statistics. I begin my inquiry in the 16th century and focus extensively on the 19th. The disciplines and curricula included in the university system changed quite dramatically over this period (Burke, 2000). Many different academic disciplines were founded, rejected and institutionalized. As an example, the field of sociology was not integrated into the university system until the late 19th century when the first two departments of sociology were founded at the University of Chicago

(1892) and the University of Bordeaux (1896). Throughout this dissertation, I have intentionally used the historic term for the discipline being discussed and not the current one.

I do this because I am following the development of an academic discipline that was influential at the time but did not survive: Quetelet's *physique sociale*. Although it was ultimately rejected, Quetelet's *physique sociale* had many rivals when it was introduced including demography and positivism. Demography was founded as a science by Achille Guillard in the 1855 work *Éléments de statistique humaine: ou démographie comparée* (Dupaquier, v2/1995, 560) at the same time as Quetelet's *physique sociale*. Guillard saw Quetelet's *physique sociale* as a *direct rival of demography* and took very specific steps to distinguish his *demography* from Quetelet's *physique sociale* (Dupaquier, 1983, 295). Similarly, Quetelet explicitly distanced his approach from Guillard's demography.

Like Guillard's demography, positivism was also founded during the period under examination in this dissertation by Auguste Comte (1798-1857) who was forced to choose the title positivism³⁴ for his approach because Quetelet had "pirated Comte's phrase, *physique sociale*, as the title of his new science" (Porter, 1986, 41). Although I certainly discuss ideas and practices that are consistent with demography and positivism, the anachronistic use of these terms in this dissertation would be inaccurate for the period I am discussing because *both* demography and positivism existed and were direct rivals of Quetelet's *physique sociale*.

Structure and methods of this dissertation

In this section, I discuss the structure and methods of the rest of the work. As mentioned, the structure of this dissertation is heavily influenced by Alain Desrosières' (2008a; 2008b) *historical sociology of quantification*. Desrosières' (2008a; 2008b) approach suggests 1) that the process of quantification involves the generation of conventions of equivalence used to draw parallels between things-in-reality and counts-on-a-list as well as the mathematical techniques used to

³⁴ Incidentally, Comte's positivism did not argue that quantitative approaches were the best means to understand the social world – a historical occurrence that has been noted by various academics who have analyzed Comte's work including the founder of logical positivism, Moritz Schlick (1948) who argues, "Every philosophical point of view is defined by the principles which it considers fundamental and to which it constant recurs in argument. But in the course of the historical development of such a view these principles tend to change...I should like to apply these considerations to the modes of thinking grouped together under the name 'positivism'. They have, from the time Auguste Comte invented the term until the present, undergone a development which furnishes a good example of what has just been said." (Schlick, 1948, 82-83).

describe their frequencies; and 2) that an historical approach is necessary to understand the quantification of social phenomena. Following Desrosières (2008a; 2008b), my dissertation begins with an examination of specific historical population list-making techniques and their changes over time, the epistemology that was developed to apply mathematical ideas to social counts during the 19th century and some of the specific techniques themselves. The point of this exercise is to denaturalize and historicize the two major techniques (list-making and the application of mathematical techniques from other domains to the analysis of these lists) that Desrosières (2008a; 2008b) associates with the statistical process.

I also follow the theoretical and organizational precedent set by Olivier Martin (1997) in *La mesure de l'esprit* and Kurt Danziger (1990) in *Constructing the Subject*. Both of these works use a historical analysis of the formation years of a discipline to understand the generation of disciplinary standards and techniques of measurements. In particular, Danziger (1990) uses an analysis of 19th-century psychological journals to understand the historical development of the psychological experimental form. In particular, he examines how the roles of 'experimenter' and 'experimental subject' including notions of experimental objectivity historically developed during this period. My dissertation replicates his approach by using a content analysis of an academic journal to track the development of statistical techniques, however, in my case, I am not interested in tracking the development of the psychological experiment but in the use of statistical techniques to 'incorporate' the 19th-century nation-state.

I use different methods and empirical sources in each chapter. In *Chapter 2*, this chapter, I develop my research question, problematic, theoretical framework and methods using a literature review of the theoretical academic literatures on nationalism and statistics in the 19th century. It provides the reader with the theoretical framework for this dissertation and the research area to which I contribute.

Chapter 3 begins my historical examination of social list-making practices by 16th-18th century European state-apparatuses which I understand as the first phase of Desrosières (2008a; 2008b) historical sociology of quantification. Here, I begin my historical analysis of European counting practices based on a literature review of secondary historical sources. I use this chapter to examine the development of early list-making and variable categories in order to establish a baseline for how lists were constructed before the 19th century so that I can demonstrate how 19th century practices were different. I show that list-making – or the idea that human population

characteristics can be fit into discrete, single words that exist along some spectrum of attributes - is a technique that developed over time, denaturalizing the list and affirming its role as a kind of social technology. I also identify some of the early motivations by proto-states for the generation of population lists including public health, taxes, religious/social conformity, military conscription, conquest of territory, enslavement of people and labour exploitation. Further, I note significant differences between population counts carried out by European power of people living in European territory as opposed to colonial territory. Specifically, I find that the frequency, rigor, scope and importance attributed to counts done of people in non-European locations were all much higher.

In *Chapter 4*, I continue this analysis with an examination of 19th century list-making practices, with particular attention to how national, scientific, and economic movements promoted changes in list-making approaches. These two chapters (Chapters 3 and 4) are important because they show how people were historically counted by European powers leading into the 19th century order and how these counts changed in the 19th century. The chapters highlight the very different ways this was done, and how these changed and why. I argue that the late 18th and 19th centuries underwent a period of rapid institutional refinement and technical standardization that allowed for population counts to be conducted across larger geographic areas with greater frequency and relative rigor. I also demonstrate the ways that organizational structure, the social character of workers and worker compensation were active concerns of 19th century statisticians who saw these topics as an integral part of data collection and integrity. I find that the metric system, the Belgian Central Commission organizational model and 1846 Belgian census – both developed by Adolphe Quetelet – all influenced the development of early national statistical infrastructure.

In *Chapter 5*, I begin my examination of the epistemological framework that was used to apply mathematical techniques to human groups, the second phase of Desrosières' (2008a;2008b) historical sociology of quantification. I do this through an analysis of four major, early treatises arguing for the application of probability theory to the study of social world. They include: Pierre Simon de Laplace's *Essai philosophique sur les probabilités* (1814) and Adolphe Quetelet's *Lettres sur la théorie des probabilités appliquée aux sciences morales et politiques* (1846), *Du système social et des lois qui le régissent* (1848) and *Physique sociale ou le développement des facultés de l'homme: Tome I* (1869). I chose these texts because they are frequently identified in the secondary literature as being very influential to the field (see, for

example, Stigler, 1999; Desrosières, 2008a, Gigerenzer et al., 1989). Although they have been discussed in the secondary literature, I conducted a detailed analysis of the content of these treatises because they contain a number of foundational *justifications* for the statistical study of the social sphere. My dissertation is interested in understanding the development and transformation of these ideas by the IIS and, for that reason, I took the time to understand and analyze both thinkers' key ideas.

This analysis was based on a very large body of work (a total of approximately 1,700 pages). I accessed PDF copies of these texts in the original French through the *Bibliothèque nationale de France's* (BNF) online archive. I accessed these texts in French because 1) not all of the texts had English translations; and 2) some English translations, as in the case of Laplace's *Essai philosophique*, used words that I thought sometimes significantly distorted the original French (ex: "omniscient demon" as a translation of the French "*intelligence*"). I then inductively refined key themes and put them into conversation with the existing secondary literature on the figures and texts being examined. I argue that Adolphe Quetelet's epistemological arguments for the application of more advanced quantitative methods to the study of human populations were a direct expansion of Pierre-Simon de Laplace's ideas that allowed for a new "realism of aggregates of things or people" (Desrosières, 2008, 68) in which the nation-state was quite literally seen as an idealized form of social organization invented by Nature herself. I found that these developments were facilitated by the general assumption developed by Laplace that discoveries in science is driven by analogy – a belief that facilitated the importation of mathematical techniques used to understand the orbit of planets to the study of human national populations.

In *Chapter 6*, I discuss the general results of analyses of the *Bulletin of the International Institute of Statistics* from 1886 - the first volume - to 1912 - the last volume to be published before the First World War. Founded in 1885, the IIS was one of the first statistical organizations to exist and one of the oldest statistical journals. It continues to exist to the present day (ISI, 2024). During the 19th century, they held bi-annual (and occasionally tri-annual) meetings in a variety of European cities and published the proceedings in the *Bulletin* following an international statistical conference tradition set by Quetelet in 1853 (Desrosières, 2008a, 27). These meetings brought together prominent academics, bureaucrats, politicians and, occasionally, aristocrats from Europe, Japan and Argentina who were interested in developing, discussing, and refining statistical methods for the description and management of human populations. Each meeting generally

revolved around a set number of thematic areas that were considered relevant for the management of nation-states (i.e., labour, economics, migration, statistical theory, etc.). Attendees of IISconferences included prominent figures from the history of statistics including A.N. Kiaer, William Lexis, Joseph Bertillon and Francis Galton, to name a few. The main language of the journal was French, but it also published articles written in English, German and Italian. I analyzed issues published between 1886-1912 because that period covers the foundation of the journal to just before the First World War when publication ceased. This time-period also makes sense if the substance of the journal is considered because the 1912 issue contains a distillation of major statistical ideas that had been developed in the *Bulletin* to that point.

I chose the *Bulletin* for a number of reasons. First, it is one of the oldest statistical journals and organizations in existence. It, therefore, gives me a strong empirical basis upon which to base my claims about the early practice of statistics. Second, because it is old and the result of a conference, the *Bulletin* includes a variety of different article formats including formal academic articles as well as transcripts of conversations held at the IIS and various minutiae related to the administration of the conference. The *Bulletin* is, therefore, a literal transcript of the development of certain statistical ideas as well as an instruction manual for their application in some cases. Finally, I chose the *IIS Bulletin* because, to my knowledge, no one has conducted an extensive examination of its early issues. The analysis of the IIS is my novel, empirical contribution to the STS and history of statistics literatures. My quantitative and qualitative analysis was based on the following questions:

- 1) What general topics were the IIS interested in knowing about?
- 2) How were statistical institutions, social categories and statistical metrics developed and made meaningful for the study of national populations?

I used a quantitative content analysis of the table of contents of each volume to answer the first question and an analysis of specific article codes (derived from the first analysis) to answer the second. I chose 1886 to begin my content analysis because that was the first issue of the *Bulletin*. I chose 1912 as the cut off year because the journal stopped publishing in the lead up to and duration of the First World War. I also relied on a supplementary index published in 1924 that summarizes the content of the first thirteen issues thematically.

I performed the quantitative content analysis by coding the articles listed on each issue's table of contents according to a set number of themes that I inductively developed and refined as

the coding process continued. My content analysis was multilingual (English, French, Italian and German) reflecting the multilingual nature of the journal during this period. There were only five full academic articles in German – a language I do not read. I sent the titles to a German-speaker and had them translated and coded the articles based on that translation. I grouped the final codes for the quantitative analysis into two major categories: *substantive* and *procedural*.

The codes in the *procedural* category relate to any article that dealt with the administration of the IIS conference or the organization itself. There are three codes: IIS internal, conference proceeding, necrology. Examples of the titles of articles or sections addressed by these codes include: *Assemblée générale: Motion d'ordre; Nécrologies; Ordre du jour* and *Fêtes et excursions*. Again, the Bulletin was the result of a recurring international conference and the procedural category includes those articles whose substance deals with the practical administration of the conference or organization. I excluded these codes from my analysis.

In the *substantive* category, I developed codes that related to the subject that the article was discussing. The codes include: *agriculture and food; births, deaths and marriages; bureaucratic organization of statistics; city statistics; legal theory; economics, finance and property; education; graphical representation; health, historical statistics; imm/em-igration; labour and workers; miscellaneous; national population and international comparison; poverty and pauperism; press; statistical theory and transport*. The IIS article titles are quite literal. Often, although not always, the name of the code was mentioned in the article title itself or close synonym of the code (ex: penal statistics were categorized as ‘crime’). In order to capture the substantive nuances in each article, each article could be classified in three different ways, although the vast majority were categorized using only one category. Examples of titles of articles included in this section include: 1) *Fécondité du mariage, rapport de la 1re section, présenté par M. Kiaer*; 2) *L'émigration portugaise, par M.O. Martins*; 3) *Lo studio della delinquenza e la classificazione dei reati nell statistica penale³⁵ del Dr. A. Bosco*. Based on my quantitative analysis, I selected specific substantive codes that are directly relevant to my research question and analyzed the texts contained within. I chose the three most relevant quantitative codes for my inquiry – *statistical theory, bureaucratic organization of statistics* and *national population and international comparison*. This chapter argues that 19th century statistics ‘built’ as opposed to ‘found’ the nation and should be understood as a technique of nation-building by elaborating on the various ways

³⁵ This roughly translates as “the study of delinquency and the classification of offenses in penal statistics”.

that Quetelet's epistemological vision was incorporated into the early statistical techniques promoted by the ISI, particularly through the projects of standardization of measures for the purposes international comparability. I find that during this period of statistical history, the major problem of standardization was largely social and qualitative, not mathematical.

Finally, the *Conclusion* provides a response to the major research question of this dissertation by summarizing the main arguments and findings of each chapter. I then address the limitations of this dissertation and their significance for my findings and identify further avenues of study.

SUMMARY:

In this chapter, I identified my research question. I then examined three different literatures which theorizing the 19th century nation-state and identified gaps in these literatures regarding statistics. I then developed the theoretical framework I will use to guide this dissertation based on Desrosieres' (2008a; 2008b) historical sociology of quantification and identified some limitations of the present study. Finally, I identified the methods used in each chapter. This dissertation uses a historical lens to empirically show the development of statistical techniques – list-making and quantitative analysis – over time according to Desrosières (2008a; 2008b) historical sociology of quantification framework. It denaturalizes the practice of statistics by showing the various directions that these techniques could have taken by laying out the trajectory of their historical development. I show how this process unfolded and some of the contention and politics that accompanied the adoption of techniques that were ultimately adopted. In the next chapter, I begin my analysis of early European list-making practices.

CHAPTER 3: 16TH TO 18TH CENTURY LISTS AND LIST-MAKING

All science is measurement
-Helmholtz quoted in Porter (1986)

Purpose and argument of this chapter

The previous chapter provided an overview of theoretical framework and major arguments made by this dissertation. In this chapter, I open the black box of statistics by examining Desrosières' first stage of the statistical process: social categorization and list-making (2008a; 2008b). Following and expanding on the precedent set by other historical works on statistics, this chapter examines the history of some major 16th to 18th century European list-making practices conducted on European and colonial territory (Hacking, 2013; Gigerenzer, 1989; Stigler, 1999). It is necessary for three reasons: 1) it allows me to demonstrate that population list-making *itself* – or the idea that the human population characteristics can be fit into discrete single words that exist along some spectrum of attributes - is a *technique* that developed over time, thereby *denaturalizing* the list and affirming its role as a kind of social technology; 2) although this review is non-exhaustive, it allows me to comment on some of the prominent rationales driving pre-national state apparatuses' motivation for population lists, noting that colonial counts tended to be done with much more frequency and rigor during this period and; 3) it provides an important point of comparison for the list-making techniques of the 19th century nation-state – both in terms of the work practices used, the social categories applied to the population and the rationales for these lists – allowing me to comment on the (dis)continuities and variation between these practices. Finally, it follows the precedent set by many academic histories and sociologies of statistics who usually provide limited summaries of early list-making techniques before their examination of statistical techniques, again, because list-making is the first component of the statistical process (Desrosières 2008a; 2008b; Gigerenzer et al., 1989; Hacking, 2013; Porter, 1995).

The arguments that I make in this chapter continue the major arguments I developed in Chapter 2. Specifically, I argue that population list-making practices by states are a *social and historical phenomenon*, a qualitative technique that was refined over time. Although ancient censuses certainly existed, the aspiration to enumerate an entire human national population based on standardized, discrete and (often) multiple social categories that exist along some spectrum of attributes did not always exist and was only widely adopted as a technique by European state-

apparatuses in the 19th century (as Chapter 4 will demonstrate). In this chapter, I elaborate on the first historical phase of European list-making practices. Specifically, I will discuss the rationales for these early lists as well as the practical work that was required to generate the ‘conventions of equivalence’ necessary to attach “things to categories” and develop these categories into ordered systems (Bowker and Star, 2000, 286).

I will show that our current idea of the list as constituted by discrete, one-word attributes existing along a spectrum did not always exist but instead should be understood as a technique that developed over time. I will also demonstrate the connection between list-making and various systems of social control that openly sought to encourage conformity, invent social protocols and rituals, inventory people like objects, erase those who did not conform and establish clear boundaries between those who ‘belonged’ and could access citizenship entitlements and those who ‘did not’ and could not (Bowker and Star, 2000, 286). The terms of this belonging had the potential to influence dynamics of social stratification. They also reflect the willingness of (some) people to be counted and the tactics they used to evade counts or misrepresent themselves for the purposes of the list. This chapter begins my elucidation of the various ways that the lists ‘invent’ rather than describe human populations.

Questions framing my selection and analysis of the secondary, historical literature

My review of the secondary literature was guided by Bowker and Star’s (2000) seminal work in the STS field on classification, boundary objects and the construction of standards and lists (6). The motivation for this work lies in the erasures they suggest are brought about by scientific and technological ways of knowing and reporting knowledge. In their view, scientific and technological inquiries have a tendency to erase the purpose, assumptions and work that goes into the generation of concepts providing only ‘authoritative’ conclusions. This is particularly true of scientific standards and list categories: “Each standard and each category vaporizes some point of view and silences another” (Bowker & Star, 2000, 5). As they note, “[t]he hype of our postmodern times is that we do not need to think about this sort of work anymore. The real issues are scientific and technological, stripped of the conditions of production” (10). Their work seeks to re-situate scientific and technological ideas within the conditions of its generation. They rely on a set of questions to elucidate the purposes, assumptions and work of standard and category construction.

I use a modified version of their research questions to guide my analysis of 16th-18th century list-making in this chapter:

- **Why were counts commissioned and by whom?**
 - What organization commissioned the counts?
 - For what purpose?
- **Who did the work and how did they do it?**
 - Under what circumstances was the work done? What/who was being counted?

The chapter is structured in the following way: I begin with a very brief discussion of ancient population counting techniques to counter claims of European historical precedence in order to show the historical (dis)continuities of population counting practices between European and non-European population counting practices and to ‘provincialize Europe’ as a particular variant of population counting practices amongst many (Chakrabarty, 2000). I then identify some major European population counts used between the 16th to 18th centuries, emphasizing those counts and categories that were later incorporated into the work of the ISI. Specifically, I examine counts of the plague dead, the parish records of Christian (Catholic and Anglican) religious rites, the hearth counts and counts of colonized, colonizing or enslaved human beings. Finally, as a note about historical context, it is important to indicate that the list-making conventions discussed in this chapter occurred before the development and implementation of the metric system (1799), germ theory (1861) and Darwin’s theory of evolution (1859). All factors that influenced 19th century lists and list-making, some of which are explored in Chapter 4.

Historicizing and provincializing population counting techniques:

The idea of a reigning power counting some or all people (or things representing people and property) in some geographic area is not at all new. Counting of human populations appears to be a common practice characteristic of many different ancient civilizations. Reports suggest that the ancient Egyptians, driven by a need for manual labourers, conducted ongoing censuses of workers during the First Dynasty (3000 BC). The ancient Israelites are understood to have been quite preoccupied with the question of counting their population, the Torah includes numerous calls for different types of population counts originating from both the Divine and the Satanic (Hecht, 1976, 23-25; Kislev, 2013; Humphreys, 1998). The ancient Greeks are reported by some to have conducted various types of fiscal and military counts of parts of their populations often using the

city-state as the unit of measurement (Hecht, 1976, 30; Harper, 2008). Some suggest that ancient Greece conducted the first 'modern' census of a population in the 16th century B.C. to assess the population size (Missiakoulis, 2010).

The ancient Romans, given their colonizing impulses and constant expansion, conducted regular and detailed surveys of their territories from the foundation of the Republic to 70 B.C., however, there appear to be different views regarding the scope of these censuses and who was included in them (Bourne, 1952, 129). The Roman censuses are reported to have included detailed information about the citizen (who was always a male) including information such as name, the name of their father, their age, their wives' and children's names, their religious affiliation and their residence. The ancient Romans even dedicated a religious ceremony called the *lustrum conditum* to the census' completion, a ceremony which, interestingly, had the power to turn slaves into citizens and vice versa depending on the outcomes of the census (Hecht, 1976, 30; Esmein, 1886, 221-222).

In Byzantium, the emperor Heraclius is reported to have initiated a Byzantine census, conducted from 636 to 641 A.D., in order to ascertain the extent of his empire in response to conquest by the Umayyad Caliphate (al-Qadi, 2008, 345). Censuses were also reported to have been commissioned in 807 A.D. in response to ongoing tax evasion by the Byzantine elite as a means to generate the revenues necessary to rebuild the ailing empire (Treadgold, 1979, 1262). Similarly, the Umayyad Caliphate, which covered large parts of North Africa, the Middle East, current-day Yemen/Oman as well as some of Central Asia, is reported to have had various tax registers, censuses and land surveys that are believed to have begun around the same time (al-Qadi, 2008, 344-345).

Outside of regions typically associated with the genealogy of Western Europe, a number of population counting practices also existed. In Asia, particularly, these practices were quite sophisticated. They often emerged significantly earlier than many Western counting practices and were much more rigorous and comprehensive in their approaches, particularly in China. Ancient Chinese censuses are classified into four different types: 1) conscription based censuses of the number of fighting men (Han Dynasty 200 BC - 200 BC); 2) land distribution censuses intended to improve agricultural production (221 BC -959 BC); 3) fiscal surveys (960 BC -1368 BC); 4) internal migration surveys intended to understand the movement of people in relation to food stores (from 1644 AD onwards) (Hecht, 1976, 26). In Japan, the first recorded survey of the population

occurred in 86 BC under the Emperor Soujin in order to understand internal migrations within Japan. Censuses of various other topics occurred within Japan from this point onward, with the first general census of parts of the population excluding nobles, the poorest and children under 15, occurred in 1721 (Hecht, 1976, 26-27).

The subcontinent of India is also notable for its early and sophisticated population counts for governance documented from the 4th century B.C. onwards. A minister of the Maurya Empire (313-226) is known for writing an entire economic treatise, similar to Machiavelli's later 16th century work *The Prince*, proposing a science of profit and state entitled *Kautaliya Arthasastra* (Hecht, 1976, 27; Weber, 1919). In the interests of a centralizing and empowering the State, the *Arthasastra* suggested a variety of human and animal (elephant) population counting techniques as well as the introduction of property registers (Hecht, 1976, 27).

Finally, in the pre-colonial Americas - home to different ancient civilizations with a variety of different types of political organization - evidence of a number of advanced economic and demographic population counts are reported to have existed. The Incas, in particular, are reported to have had two sophisticated and extensive population counting systems that stretched from the municipal level to the level of Empire. One, called the *llactacamayos*, was linked to the payment of tribute (taxation) and the other, later called the *decimal hierarchy*, was linked to labour recruitment. The second is reported to have been adopted by Spanish conquistadors and served as the basis for the colonial Spanish *encomienda* system of forced labour (Julien, 2006). Counts of people, animals and things were recorded with a device called "quipo" or "quipu". These machines used a mathematical notation that employed different coloured cords and different types of knots, placed in difference locations, to indicate counts of people and objects (Hecht, 1976, 31; Julien, 1988, 258; Luxton, 1979).



Figure 1: An example of a quipo

This brief survey indicates that social counting practices are very old and have been used by a variety of ancient civilizations. I want to stress that there is nothing novel about social counting practices nor are they specific to Europe.

Early modern European population counting practices and list-making techniques (16TH -18TH centuries)

Like the ancient world, population counts by Western European powers from the 16th to 18th centuries are reported to have been conducted infrequently with some exceptions. They tended to focus on particular regions or particular groups of people and were conducted/carried out with very specific questions in mind. The major historical rationales for counting people are reported in the secondary, historical literature to include counts for public health purposes, counts for taxation purposes, counts of those people who were enslaved and traded, counts of people in conquered territories, conscription and military counts and counts of participation in ecclesiastical rituals (baptisms, marriages, confirmations and deaths) (Goubert, 1965, 458; Dupaquier, 1988). Generally, the organizations and officials dedicated to these tasks did the counts in conjunction with some other work. Geographically, counts by European powers carried out from the 16th to 18th centuries tended to have been performed differently in separate regions (see Table 1 below). Counts by authorities tended to be conducted in wealthy regions or cities with the resources to count all members of the population. Infrequently, attempts were made to survey entire kingdoms but with very limited success and great controversy (Hecht, 1976; Dupaquier, 1988).

Outside of Europe, in the American and the Caribbean colonies, population counts conducted by European colonial powers were conducted with comparatively greater regularity and precision than those done in European territory – a trend often unremarked in the Foucauldian literature on governmentality (Dupâquier & Vilquin, 1976, 93-95). This is likely related to the commodification and literal inventorying of people enslaved by the Atlantic slave trade, and the population of colonies through migration and military conquest. In the following sections, I provide a non-exhaustive survey of prominent European population counting practices.

Table 2: 16th - 18th century censuses and population counts in Western Europe and Canada (chronological)

Year	Document	Current Region/Country
1514	Regions of Frise and Haard (Holland)	Holland
1526	Census of Rome	Rome/Italy
1527	Census of Kingdom of Valencia	Valencia/Spain
1539	Census of inhabitants of Ville d'Avignon	Avignon/France
1548	Census of various Sicilian areas	Sicily/Italy
1561	Census of Savoie	Savoie/France
1565	Census of Berry	Berry/France
1563	Census of Kingdom of Valencia	Valencia/Spain
1569	Census of Bourbonnais	Bourbonnais/France
1570-77	England – fighting men population inquiry	
1577	Jean Bodin's Les Six Livres de la Republique	France
1568-85	Parish profile of Kingdom of France	France
1582	Census of Bohemia	Bohemia/Germany
1590	Census of Paris	Paris/France
1599	Sully, Superintendent of Finance, reform in system of accounts increased statistics	France
1605	Record of population of founding colony of Port Royal	New France/Quebec, Canada
1608	Record of founding of Quebec	New France/Quebec, Canada
1608	Register of Trinity Church in Uppsala	Uppsala/Sweden
1615	Traite d'Économie Polytechnique by Anthoine de Montchrétien	France
1629	Bills of Mortality of London	London/England
1661-62	Graunt's Observations on London Bills of Mortality	England
1662	Census of adult males for military	Norway

1663	Enumeration of administration, commerce and manufactures for Colbert	France
1663	Population count of New France	New France/Quebec, Canada
1666	First population count called “census” performed*	New France/Quebec, Canada
1670	First publication of count of baptisms, births, deaths and burials registered for Paris	Paris/France
1672	Inquiry into increase/decrease population	France
1686	Ecclesiastical law mandating parish registers of marriages, births, baptisms, burials and names of people moving in/out of parishes	Sweden
1693	Halley’s mortality tables published	England
1696	Inspector General of Imports/Exports authorized to keep records of trade	England
1698-1700	Development of Les Mémoires des Intendants from a questionnaire which became the basis of all French works on population	France
1699	Sir William Petty’s Essay on Political Arithmetick	England

Reproduced from Walker (1929) Studies in the History of Statistical Method, p.34-36 and enhanced with

*E.H. Godfrey History of Statistics and enhanced with information from Hecht (1976)

A: Counting and reading the dead: *La cerca* and the Searchers

It is ironic that of all population counts, it is counts of the dead and not the living that are some of the oldest and most established European counting practices, beginning in the 15th century. Counts of those who had expired from plague were developed very early on to assess the progress of the plague and, by contrast, infer the state of the living human population within a given territory (usually a parish or municipality) (Biraben, 1976, 106-109). The plague counts are also notable because they include larger portions of the European population than other population counts that were much more strictly bounded by religious sect, class or gender. In this section, I provide an overview of major European plague counts.

Why were counts commissioned and by whom?

In Europe, registers of plague dead came from several sources, but they were usually mandated by municipal authorities given the prominence of the city-state as the major form of political

organization during this period (Tilly, 1990). Biraben (1976) suggests that the template for European accounts of the plague was developed in 15th-century Barcelona and later adopted by other European localities over the course of the 16th and 17th centuries, migrating as far East as Byzantium. The technique, called *la cerca* ('the fence') was an internal administrative list, recorded daily, of those who had died of plague, assembled only during times of plague and usually inaccessible to the public (Biraben, 1976).

In 17th century northern Italy, the wealthy city centers (Florence, Milan, Venice, Mantua) had extensive social infrastructures that mandated the counting of the dead through Bills published by municipal authorities from as early as 1385 (Florence) (Cipolla, 1978, 543). Counts of the dead were often mandated by Magistracies of Public Health who existed as part of the city-state apparatus in all of the major city centers. They exercised "legislative, judicial and executive power" for all things related to health in that city center (Cipolla, 1978, 543). The tracking of deaths was done to understand the progress of plague. These counts were collected in the aptly titled *libri dei morti* (Books of the Deceased) which, like in Barcelona, were never publicized and were collected for administrative use only. They were housed either by a municipal authority called the *Grascia*³⁶ or by a professional Guild (Cipolla, 1978, 543).

In England, the approach to the counts of the plague dead was slightly different in that the weekly reports generated from counts of the dead were not limited to the eyes of municipal administrators but were displayed publicly in what are now called the *London Bills of Mortality* which began in 1603. No analysis was done of these numbers for at least a half a century after their emergence (Hacking, 1990/2013, 2). Indeed, it was not until 1662 that a London haberdasher and amateur mathematician, John Graunt³⁷ (1620-1674), applied his "shop-Arithmetique" to the bills suggesting that they *could be analyzed* (Chatterjee, 2003, 161; Graunt, 1676, 5). The significance of this cannot be understated. This laid the basis for the 17th-century science (now defunct) of *political arithmetic* that is often identified as one of the precursors to statistics (Munkhoff, 2010, 128; Smith, 1936, 84).

³⁶ Vulgar Latin for 'fat' ('crassia'). This would have been the municipal body that collected taxes and housed provisions, particularly cereals.

³⁷ There is some debate around whether John Graunt's work was actually written by William Petty who is the founder of political arithmetic.

Who did the work and how did they do it?

The responsibility of actually looking at the dead bodies in order to establish who had expired from plague and who had not varied depending on geographic location and historic period. Generally, the work could be implemented by a variety of people including clergy, medical practitioners, grave diggers, and, in one case, a contracted group of old women called “the Searchers”. It was very dangerous and would most likely kill the inspector due to the extremely contagious nature of plague, rendering the role difficult to fill and the search for workers ongoing. Indeed, as one can imagine, the plague (of whatever variety) was indiscriminate in its reach and had the ability to completely dismantle whatever social infrastructure existed, rendering consistent and reliable counts of dead bodies difficult. This led to tremendous gaps in the accounts of the *cerca* and its later incarnations, pointing to a number of ways in which the validity of these counts could obviously be limited (Biraben, 1976, 109-110; Forbes, 1974; Munkhoff, 2010).



Figure 2: Protective outfit worn by plague doctor to ward off plague

In the case of the Barcelona *cerca*, the task of constructing the daily lists was tasked to a municipal chaplain, however, the person who was responsible for going to the various parishes to inquire about the dead is reported in one text to have been the mailman who consulted with clergy during his daily routes (Smith, 1936, 85). Biraben (1976) also suggests that early administrative responses to plague appointed surgeons to inspect the dead (113). This indicates that the initial

responses to the plague initially sought expert opinions to assess and count the dead. Indeed, Biraben (1976) is quick to note that plague introduced a new alliance between the medical and political sphere (1976, 126). However, medical experts proved practically difficult to retain during outbreaks and frequently fled plague-ridden cities (Biraben, 1976, 128). In another example, the Florentine municipal account of plague notes that all deaths had to be certified by a licensed physician or surgeon and grave diggers were instructed that no burials could take place without this certificate (Cipolla, 1978, 543). Grave diggers were obliged to report all burials and names of the buried to either a municipal authority or the guild of physicians and apothecaries (Cipolla, 1978, 543).



Figure 3: Etching of plague workers transporting bodies during 1665 plague in London, England

Whereas the counts of the dead in Barcelona and Florence were done by people in the course of another professional duty (i.e. grave-digging, surgery, the mail), in England, from 1578 onwards, a municipally-appointed professional group, cryptically called “the Searchers”, were used by the city of London with the express purpose of inspecting dead and living bodies for signs of plague (Munkhoff, 2010, 119; Munkhoff, 2014; Forbes, 1974; Forbes, 1970). A 1591 declaration from the City of London indicates that two Searchers were assigned to every parish

(Forbes, 1974, 1032). Initially mandated only to identify those dead (and sometimes living) bodies rendered so by plague, in the 17th century, their portfolio was later extended to include the inspection of all dead bodies for cause of death (Forbes, 1974,1032). In a divergence from most other professional municipal postings, the Searchers were almost exclusively, although not totally, “sober and Ancient women” (Forbes, 1974, 1032). Munkhoff (2010) suggests that the explicit demand for women was linked to women’s domestic role as caregivers and assumed knowledge of the healing arts (2010, 122). Searching was not well-compensated, and the Searchers were reported to have very limited reading, writing and numeracy abilities as can be expected for the period (Forbes, 1974, 1033). There are limited accounts of how the Searchers performed their assessment. Some reports claim that they looked at the entirety of the dead body in order to determine cause of death, however, common practice is reported to have been to inspect the head and feet of a dead body for black abscesses or to base the cause of death entirely on the testimony of those who witnessed the death (Forbes, 1974, 1035). The work of the Searchers became the basis of the Bills of Mortality - the first data source to be analyzed by the political arithmeticians (Chatterjee, 2003; Hacking, 2006; Hald, 2003).

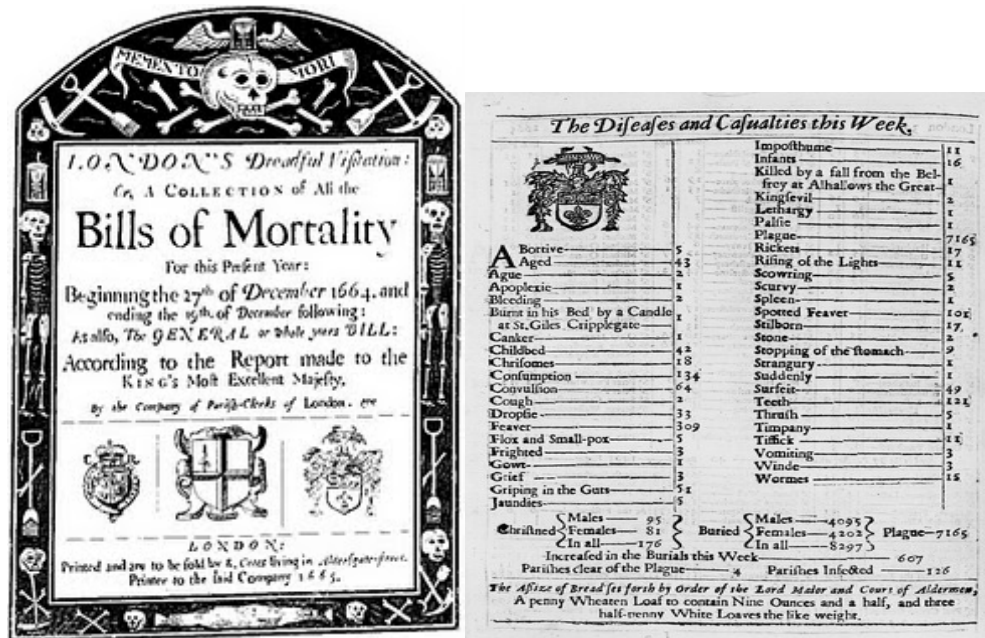


Figure 4: Title page of collected Bills of Mortality (December 27, 1664 - December 18, 1665) and example "The Diseases and Casualties this Week" (1665)

As one might expect, over the course of the hundreds of years that Bills of Mortality were collected, the categorization and list-making techniques used to generate them changed and were

refined. It is worth noting that the way that causes of death were recorded in the 16th-century Bills were not standardized and did not describe death in the same ways that we describe death now. As Bowker and Starr (2000) keenly observe in their brief discussion of the Bills, *the idea of a variable in a list is itself a technology*. The individual disease categories that we would expect now are certainly present, such as *jaundies*, *gout* and *scurvy*, however, other categories of death such as *infants*, *teeth* or *mother*, that relate to a characteristic of the deceased or the body part believed to be associated with the cause of death (probably), are also present and listed as a cause. Other categories identified as causes relate to the velocity of disease onset, describing death using terms like *suddenly*. Death categories are not mutually exclusive and when two death ‘causes’ are combined the circumstances of death can still remain unclear. For example, *apoplex and suddenly*, *cold and cough* and *teeth and worms*. Finally, some list categories are not categories at all but short anecdotes about the death, such as *burnt in his bed by a candle at St. Giles Cripplegate* or *fainted in a bath* and appear so hopelessly specific that one wonders how they could appear in a list at all (Forbes, 1970; Bowker and Starr, 2000).

Interpretation:

The plague counts illustrate that *public health* (the control of disease) was a major concern for administrative infrastructure from an early point onwards. The thing being counted was a dead body, generally by someone who had to interact with it in the course of some other function with the obvious exception of the Searchers. Fairly large segments of the population, regardless of faith, gender, age, religion or class, were included in these counts. That said, there are numerous ways that the counts likely failed to accurately reflect the number of dead, both due to the dangerous nature of the work and the novelty of list-making practices.

The plague counts are notable because they illustrate the development of list-making techniques, particularly the transition from anecdotes about death made of sentences to the use of discrete single-word variables that described the death – albeit still in an unstandardized and vague way. These different categories usually conflated aspects of the death process with the social or physical characteristics of the person who had died, such as ‘teeth, baby and suddenly’. The plague counts are also important because they were one of the major data sources analyzed by the political arithmeticians.

B: Parish registers

Another source of information about the general population in Europe that was collected with some historical regularity from roughly the 16th-century onwards are parish records. A parish is the geo-political-religious area administered by one church and its pastor. It was the geographic unit of political governance for many years. The parish records were tied to efforts to cement the power of the Church and/or the monarchical State by registering and regularizing Christian life rituals. Religious affiliation was an important component of social life and mechanism of social control, deciding the legitimacy of romantic and parental relationships as well as inclusion in social rites such as birth and death that could ultimately decide whether someone was accepted or not by the community (Laplante, 2019; Finlay, 1978; Loschsky, 1967). They are an important source of historical information about the ‘average’ non-blasphemous Christian person at a time when the majority of people were illiterate and unable to produce written records of their lived experiences and or read holy texts and were forced rely on a literate class of priests and administrators to do these things (Anderson, 2006). Parish records were introduced nominally to both encourage and document the *Christian* life rites of whatever sect was attached to the ruling state-apparatus. They usually include the documentation of important Christian life rites such as births, deaths and marriages, however, sometimes also noted a hodgepodge of any number of social and natural phenomena related to the maintenance of the parish population, including charitable giving (alms), care work of the elderly and sick, budget keeping and payment information, extreme weather patterns, medical information and, at times, plague counts (Cipolla, 1978; Biraben, 1976; Munkhoff, 2014). They are a good illustration of the way in which social quantification is both intricately tied to the imposition of political and religious systems of social control and restricted by these systems (Kent, 1995; Munkhoff, 2014). They also demonstrate the ways that lists in/exclude groups. In this section, I provide a brief overview of parish records. For the sake of brevity, I limit the overview to the kingdoms of England and France.

Why were counts commissioned and by whom?

In both France and England, the parish records were mandated by specific religious and political decrees. England famously rejected Catholicism and adopted Anglicanism in 1536 and the parish records were mandated by royal decree shortly thereafter, in 1538 (Finlay, 1978, 96; Waters, 1887,

6; Kent, 1995; Poos, 1989, 795). *The Book of Common Prayer*, an Anglican liturgical guide developed in 1549 (and still in use with modifications), was an important Protestant liturgical document that gave explicit instructions on how the rite of baptism should be performed and, most importantly, *recorded* (Tjondrowardojo, 2010, 177). Following this initial decree, the content of the parish records (i.e. the information collected) was subsequently mandated by various monarchical declarations like Elizabethan Poor Laws, Acts of Parliament or Royal Ordinances.

The kingdom of France was heavily connected to the Catholic Church and was at the forefront of administrative record-keeping during the 16th and 17th centuries. The recording of births, deaths and marriages was mandated for all Catholic places in the 1563 *Council of Trent* and was further reinforced in the French context by the royal *Ordinance of Blois* (1579) that required registers of baptisms, burials and marriages to be submitted annually to local government officials (Maxwell, 1955, 89). Like the Protestant example, the protocol for documenting life events was elaborated in the 1614 *Rituale Romanum*, a book explicitly detailing Catholic ritual protocols and their documentation (Henry, 1965, 437). In this case as well, the purpose of French parish registers was also heavily connected to imposing a system of social control and centralized administrative hierarchy. In particular, these requirements played a role in regularizing the practice of marriage as administered by a religious authority (as opposed to the previous practice of inviting a notable from the community, who was not a priest, to minister the ceremony which had been the custom before this point) (Maxwell, 1955, 89). One French parish record, for instance, notes clearly that its intended purpose was to “*faire rapport des scandales et des fautes, en connaître et en juger avec le pasteur*” (Bolle and Desouliès, 1965, 322).

Although the counts were conducted by parish representatives and kept in parish records, the ordinances and declarations for their keeping could be political and economic in nature. For example, in England, Anglicanism was not the only Christian sect present. England was also home to large populations of people from various non-Anglican, Protestant sects (Methodism, Baptist or Quakerism were popular) as well as Catholics whose marriages were not initially recognized by the state (Krause, 1965, 380-381; Eversley, 1965, 387). As a result of ongoing political tensions around state-recognition of non-Anglican marriages, civic marriages - intended to cater to non-Anglican religious movements - were introduced in England quite early on, in 1660, through an Act of Parliament and were included in parish registers (Waters, 1887, 17).

In addition to manifesting political tensions, the parish records could also reflect economic motivations as well. For example, an Act introduced by the English Parliament between 1666-1680 required the dead - excepting plague dead and the destitute - to be buried in a shroud of wool, with a coffin lined with wool, using a foot tether for the corpse that was also made of wool - all of which had to be *English-made* (Waters, 1887, 19). This dictate was strictly monitored and required that the relatives of the deceased swear a formal affidavit that the corpse had been buried in English wool (Waters, 1887, 20). The rationale for the use of wool had nothing to do with hygiene or ritual – the Christian Bible clearly indicates that Jesus was buried in linen. Instead, it had everything to do with the ailing English wool industry and ongoing conflict with France, the premier exporter of linen at the time. The wording of this act explicitly states that it was introduced “for the encouragement of the woollen manufactures, and prevention of the exportation of moneys for the buying and importing of linen” which was imported from France (Waters, 1887, 19). Rigorous counts of the dead (buried in wool), in this case, were just indicators of policies meant to rehabilitate the English wool industry to the determinant of France’s industry.

Who did the work and how did they do it?

As expected, the people who did the counting were heavily associated with the Church and sometimes the state. In France, they appear to have largely been Catholic clergy (Dupaquier and Lachiver, 1969; Croix, 1974). In England, ongoing tensions around the religious versus civic nature of marriage due to the presence of many non-Anglican Christian minorities, led to the introduction of secular parish register officials appointed by the local magistrate who were responsible for both counting those who were married and dispensing the mandatory Register’s Certificates, for a fee, without which no marriage could be celebrated (Waters, 1887, 13-15).

Although they were often mandated by some kind of royal or religious decree, the quality of the counts, and their validity, was quite variable. With some exceptions, they were generally not subject to strict control by a central state or religious apparatus nor were there penalties for non-compliance (nor is strict state control necessarily an indicator of their accuracy). As a result, there is tremendous diversity in the quality of parish records as their collection was based on the individual volition and discipline of parish priests (Henry, 1965; Maxwell, 1955; Loschsky, 1967; Forbes, 1970). Some parish records were never collected, some were collected in an *ad hoc*

manner on scraps of paper, while others were collected formally and regularly in books maintained at individual parishes (Loschsky, 1967). Further, even when they were collected regularly, the events recorded - the words, categories and details used to describe life events - varied significantly across parishes or groups of parishes with no standardization (Krause, 1965; Tjondrowardjo, 2010; Munkhoff, 2014). The information collected was also quite variable. Although they commonly contained information about births, deaths and marriages they could also include information about migration between parishes, banishments, special services, celebrations and processions as well as miscellaneous remarks about non-religious events like the weather (Croix, 1974, 28).

In terms of their scope, the religious rationale for the parish records indicates that the life events of non-Christians, people not part of that particular Christian sect or other religious non-conformists would often not have been included in the registers making them unreliable records of the life events of populations (Loschky, 1967, 472; Eversley, 1957; Maxwell, 1955).



Figure 5: Example of parish record from St. Mary's Frittenden Church in England (1563)

Even life events of people considered socially acceptable by the Church (practicing Anglicans) did not necessarily map onto the natural life cycle and were filtered through various

types of Christian doctrine and political initiative (Henry, 1965, 437). The date of a baptism, for example, did not always correspond, even approximately, to the date of a physical birth. In England, those people who belonged to the Baptist, evangelical and, to a certain degree, Methodist Protestant movements either practiced adult baptism or delayed baptism for children (Krause, 1965, 388). Baptisms were also delayed for practical reasons because the family was customarily required to give a public dinner and those who could not afford to do so had to wait (Krause, 1965, 388). Children born outside of marriages, generally unacceptable during this time-period, were also accounted for differently. Some accounts suggest that they were not baptized (or recorded) at all and others find that they were baptized and more heavily detailed in the records. One account, for examples, notes that children born out of wedlock were identified with a notch beside their entries and labelled with the term “bastards”. Their entries included the reported father and more details about the circumstances of the conception and birth as well (Krause, 1965, 397; Tjondrowardojo, 2010, 185).

Figure 6: Parish records from Paroisse Puy-Paulin from the archives of Bordeaux (1668-1680)

counted. Religious burial exemptions were extended to members of different sects of Christianity as well as those whose souls were condemned by Christian doctrine or practice. For example, Anglicanism forbade the burying of criminals who had been executed, people who killed themselves by suicide, those who had been excommunicated from the church and those who had never had an (Anglican, presumably) baptism. These people found their final resting places in unconsecrated and uncounted ground (Krause, 1965, 380-81).

Interpretation

The parish counts are notable amongst early lists because the rationale for their execution dealt almost exclusively with the generation of *social conformity* through the imposition of Christian life rituals – baptisms, marriages and deaths. As opposed to other counts examined in this chapter, which imposed social control and documentation through some other rationale (taxes, public health, colonization, enslavement), the parish counts are bordering practices because they dealt almost exclusively with the construction of group membership based on religious identity and conformity to ritual. The thing being counted was an act: a person's participation in a Christian life event. Although these counts were conducted fairly regularly, they are limited in a number of ways. First, the people being counted had to be observant Christians, generally of whatever Christian sect was associated with the monarchical state-apparatus, from the parish that was being documented. Christians from different sects, non-Christians or Christians who did not conform to ritual were not included in the counts. Further, the parish records present numerous opportunities for inaccuracies because they were collected in an *ad hoc* manner and were unstandardized across parishes.

C: Fire, famine and taxes: the hearth count

Another well-established population counting technique that, like the plague counts, emerged around the 13th century in Europe was the hearth or fires (“*feux*”) (Bautier, 1959; Alimento, 1993; Behrisch, 2016). The hearth counts are perhaps the strongest example of Desrosieres' concept of *quantification* (as opposed to counting) because the physical object that was counted was inanimate - a hearth or fireplace - and was often made representative of not just *groups* of people

but their social characteristics as well. This represents quantification because the hearth counts were not at all a simple matter of counting things that already existed. All kinds of assumptions were made, and devices created to make these ‘population’ counts function. In this section, I will discuss the hearth counts in what is now England and France as a large secondary literature exists on this topic.

Why were counts commissioned and by whom?

In the Kingdom of France, hearth counts appear to have been a regional phenomenon and like the plague counts, happened in places with the resources, social infrastructure and authorities interested in conducting them. Hearth counts of Paris, for example, a particularly wealthy area, were conducted very early on, from 1292 to 1313, and are documented in the *Les sept livres de la Taille de Paris*. In the Kingdom of England, formal hearth counts appear to have occurred later when a municipal hearth tax was formally declared in 1662 at the behest of the Kingdom (Unwin, 1985, 5). The rationale for the use of hearth counts appears to be two-fold in both England and France. Firstly, hearths were counted to establish the number of mouths to feed in preparation for famine. Secondly, hearths were counted as part of novel taxation effort brought about to counter the frivolous spending of the monarchy who were constantly bankrupting the regime and were always looking for new sources of income (Bautier, 1959; Unwin, 1985).

Hearth counts are different from the parish records in that they appear to have included a broader array of social groups, particularly non-Christian or Christians from sects not affiliated with the state-apparatus, in their counts. In one example, Bautier (1959) suggests that it was the town magistrate who was responsible for knocking on Christian doors to gain access to hearths. When non-Christian communities were present, for example in Jewish communities, a Jewish representative was responsible for the counting, however, it is unclear how common this practice was (Bautier, 1959). The reason for the inclusion of a broader range of social groups in the hearth counts is likely because hearth counts were used for taxation and groups considered to be outsiders were often taxed more than other groups. It is also likely that people would have actively tried to avoid being counted in hearth counts for this reason.

Who did the work and how did they do it?

There was variation in who did the work of the hearth counts. In both the Kingdom of England and the Kingdom of France, the hearth counts appear to have been conducted by minor governmental representatives who were tasked specifically with doing that work (and did not count hearths as part of some other professional duty unlike the plague counts). In England, the count was directed at the occupiers of the homes (not the landlords). Property owners and privileged bodies, the very poor, charitable institutions and ‘foreigners’ who hearkened from outside the parish were excluded from the counts (Unwin, 1985, 6; Goubert, 1965, 459). The count itself appears to have been done either by soliciting the testimony of the occupier of each dwelling as to how many hearths existed in the home or by a full home inspection by an official would enter the home and find the hearths (Unwin, 1985, 7). The geographic and administrative unit, like the parish and plague counts, was either the township (in England) or parish (in France and Italy) (Bautier, 1959; Unwin, 1985).

Unwin (1985) claims that a special set of government agents called receivers and sub-collectors were appointed to do the counting by order of the King (Unwin, 1985, 7). Findings were then transmitted up a well-established chain of administrative command in more or less the following order: the local farmers or petty constable to the high constables, sheriffs and then the exchequer (Unwin, 1985, 7).

* 290 . GÉNÉRALITÉ D'AUCH.

ELECTION DE COMENGE.

Le Receveur est le chef-lieu de cette Election. C'est saint Bertrand celui de l'Exchequer de Comenge, situé dans l'Election de Rivière-Vardun, où il est employé.

Par.	Feux.	Bell.	Quart.	de Bell.	Par.	Feux.	Bell.	Quart.	de Bell.
F					Casties.	2	89	2	
Châtelaine de Muret.					Empaux.	1	75	1	
Ontenilles.	3	53			Espeon.	6	34	2	
Fronzin.	3	58			Fulignac.		40		
La Bastidette.	1	28	3		Garavet.	5	68	2	
La Bastide des Feuillans.	3	59			Genfac.		60		
La Case, Justice Royale.	4	13	1		Goudex.		88		
Laverpore, Justice Royale.					Gouts.		33	1	
Le.	5	56	2		La Bastide-Savez.	2	42	3	
Le Bosc.	2	71			La Garde.		38	3	
Le Hauga.	5	83	1		La Hilliere.		32		
Lesperes.		76			La Hage.	1	16	2	
Mauzac.	6	59			Laymont.		5	18	
Muret, Ville, Justice Royale non ressortissante, Mairie particulière, Election, Cafernes.	50	47			La Haugaredé.		22		
Pins.		34			Lantignac.	3	39		
Poucharamet.	6	60			Le Puy de Touges.	3	14	1	
Roquette.		8			Le Peyrigué.		76		
Roques.	3	48			Le Planté.	2	37		
Saubens.	3	4	3		Le Pin.	3	97		
Sahuguedé.	3	30	1		Lombes, Ville, Exchequer.	11	67		
S. Alary.	3	1	1		Montadet.	3	12	2	
S. Amans.	2	8	3		Mourlens.	1	0	2	
S. Jean de Poucharamet.		97			Montgras.	1	52		
					Montblanc.	6	56		
					Montagus.	2	15		
					Montpezat, Bourg.	5	55		

Figure 7: Extract from Nouveau dénombrement du royaume par généralités, élections, paroisses et feux, Tome 1.

The lists themselves and academic writing on the lists suggest that counting was not as straightforward as one might expect as hearths were classified and valued in different ways for taxation purposes. They could also be classified into simply *feux*, *feux priv.* and *feux taill.* - categories presumably representing hearths, private hearths and hearths counted (Saugrin, 1735b, 13). Other breakdowns also divide hearths into smaller sub-hearth units, for example, hearths (*feux.*), *Bell.* And *quarts de Bell.* (Saugrin, 1795b, 240). It is unclear if these fractions were a reflection of the size of the hearth (home or family) or if they were simply administrative divisions. Hearths were also frequently anthropomorphized taking on a variety of social characteristics as part of the counts (Goubert, 1965, 460; Saugrin, 1735a; 1735b). For example, in some records, hearths were also attributed genders and were described as either female or male - a division that may have reflected gendered taxation schemes (Dupâquier, 1969). What is notable here is that hearths are obviously not human. They are inanimate objects without gender. However, they were attributed social characteristics because that was considered the most expedient way to reliably estimate numbers of people for taxation purposes.

Perhaps the most interesting of these categorical practices is the division between *les feux de compoix*, roughly the fires or hearths of the register (*compoix* is the *langue d'oc* word for *cadastre* or register), and *feux allumants* or lit hearths (Goubert, 1965, 460; Biget, 1989, 101). This is because the secondary historical literature clearly indicates that the *feux de compoix* were complete fabrications, figments of the list *itself* that did not exist in the physical reality and were known by the counters not to exist. These *feux* were accepted by convention as products of the list that were completely unreflective of physical hearths and intended only as a mechanism to calculate the distribution of taxes across communities (Goubert, 1965, 460; Frêche, 1971, 511).

Finally, hearth counts usually include a category for *personnes*, a number that was generated by multiplying the hearth by a fixed coefficient in order to generate an estimate of the number of people living in the house (Saugrin, 1795b, 331; Bautier, 1959). All hearths, however, were not created equal and the coefficient varied depending on the community of people counted. – illustrating Desrosières' (2008a; 2008b) idea of quantification. In France, some secondary literature suggests that coefficients would change depending on the religion attributed to the inanimate hearth. In Bautier's (1959) discussion (which almost certainly did not represent a universal standard but is a good illustrative example), if the hearth was Jewish, the multiplier was 4.3 and if the hearth was Christian the multiplier was 5.2 (Bautier, 1959, 520). Whether these

multipliers had some basis in administrative experience – for example, if observation had suggested that Jewish families *were*, on average, smaller than Christian ones – is unclear. However, why decimals were necessary is unclear (unless, for example, a baby was considered to be .2 or .3 of a person). Goubert (1965), in his analysis of the counts of the city of Paris, argues that the multipliers were likely “arbitrary and variable” with no empirical basis in reality whatsoever (459). They could have also been chosen in order to furnish a desired result to the administration or lend an air of sophistication to an otherwise routine administrative text.

Interpretation

The hearth counts were carried out for the purposes of *taxation* to fund the state. They included large segments of the population for this reason. The work done to generate the hearth counts was fairly formal, done by official state representatives whose main function was to collect taxes. They also appear to have been conducted more regularly with relatively more standardization. The hearth counts are notable because the thing being counted was not people. Instead, they used hearths as a proxy for people and made the hearths take on social characteristics like gender and religion that were deemed important for the purposes of taxation. They then used multipliers - the most ‘complicated’ mathematical technique applied to early population counts - to generate estimates of the number of people in a house based on the presence of a hearth. The hearth counts were approximative because the hearths were used as a proxy for people. There is also a strong likelihood that the people being counted would have attempted to evade the counts because of fear of taxation.

D: Counts of colonized, colonizing and enslaved people

Counts of people - enslaved, colonizers and colonized - both trafficked across the Atlantic and in the colonies - were performed by European powers from the 16th century onwards. Generally, these counts of people were carried out with much more rigor, frequency and detail than population counts done in Europe by the same European state apparatuses (Bourdelaïs, 2004; Dupâquier & Vilquin, 1976; Thornvaldsen, 2017). There are multiple potential reasons for these phenomena. First, the ongoing conquest of territory demanded that the colonizing power be militarily prepared to attack, either from another colonial power or the people who were being colonized or enslaved.

Second, the institution of trans-Atlantic slavery - the major source of forced labour for the mines and plantations that formed the backbone of the colonial, mercantile economy - counted human bodies as literal commodities. There was, therefore, significant financial incentive to counting and describing enslaved peoples (Dupâquier & Vilquin, 1976, 93; Thornvaldsen, 2017).

In this section, I will briefly discuss the *colonial censuses* done by the English and French as well as *trans-Atlantic slave counts* conducted as part of the Iberian, English and French slave trade. In addition to replicating European systems of counting people including parish-based counts, counts of the poor and plague counts - the colonial context also introduced novel ways of counting and classifying people that were often more detailed than counts of people in Europe and heavily featured the category of race – a category not present in the European counts from the same period surveyed in this chapter. In some cases, existing indigenous systems of population counting were appropriated and integrated into the colonial state apparatus. As a brief reminder, the first wave of colonization occurred in the Caribbean and Latin America and was dominated by the Spanish, Portuguese and, to a lesser extent, the Dutch and then was followed by another wave of colonization led by the English and French in North America.

Why were counts commissioned and by whom?

Colonial censuses

In the French colonies, counts of colonizers, indigenous and enslaved people are reported to have been conducted frequently from the 17th century onwards in New France (Canada), Saint Domingue (Haiti), the Antilles and Martinique. Despite claims that England's colonial counts were sporadic (Christopher, 2008), Wells' (1975) historical demographic work on the population of the British colonies before 1776 conversely suggests that fairly regular counts of people in the colonies began in the late 17th and 18th centuries. English colonial counts began in the colony of Virginia from 1623-1625 and were institutionalized in 1670 (Wells, 1975, 13).

What is most interesting about the colonial counts is the fact that they are reported to have been commissioned and used largely by administrators based in Europe and *not* the local American colonial administrators. In the French case, it was the monarchy, particularly the Minister of Finance Colbert, who commissioned the counts. In the English case, initial counts of the colonies were driven by merchants, particularly one wealthy English merchant named Thomas Povey, who

founded the Council for Foreign Plantations in 1660 which was the major mercantile organization associated with the early English colonial project. The royal government took control of this council in 1670 and mandated the colonial governors to conduct mandatory annual counts (Wells, 1975,7-15). The impetus for the counts appears to have been multiple but focused largely on assessing colonial viability and expansion – particularly by counting the number of enslaved people - in addition to imposing social control, assessing economic exploitation, military conscription, and, in some cases, taxation (Wells, 1975; Dupâquier & Vilquin, 1976, p.100). The *ratio* of colonizers and enslaved people is reported to have been a source of constant consternation for colonizing powers who were interested in maintaining their tenuous grasp on both land and people and saw a large European civilian and military population as a key indicator of the success of the colonial project. Table 3 provides an example of the types of information collected by the British Colonial censuses of the 17th and 18th centuries.

Table 3: British colonial censuses of the 17th and 18th centuries

COLONIAL TERRITORY	YEAR
Bahamas	1722 – R, Mil 1731 – R, S, A, H 1734 – R, S, A, F, H 1773 - R
Barbados	1673 – R,S 1676 – R,S,A, Mil. 1680 – F, H, P 1684 – R, S, A, F, Mil., H, P 1712 – R, S,A,F, Mil., H, P 1715 – R, S, A, H, P 1724 – R 1734 – R, S, A, Mil. 1748 – R, S, A, F, Mil., P 1757 – R, S, A Mil., P 1768 – R, F, P 1773 – R, S, A, F, Mil., P
Bermuda	1698 – R, S, A, Mil., P 1721 – R, S, A, Mil., P 1723 – R, S, A, Mil., P 1727 – R, S, A, Mil., P 1729 – R 1731 – R 1749 – R, S, A, Mil., P 1756 – R, S, A, Mil., P 1762 – R, S, A, Mil., P 1764 – R, S, A, F, H, P 1768 – R, S, A, Mil., P 1773 – R, S, A, Mil., P
Canada	1762 – R, S, A, F, Mar., Mil., H, P

Connecticut	1756 – R, P 1762 – R 1774 – R, S, A, Mar., P
Dominica	1763 – R, A 1773 – R, F, Mil.
Georgia	1738 1740 1750 – R 1753 – R 1756 – R
Grenada	1747 – R, S, A, F, Mar., Mil., P 1763 – R, A
Jamaica	1661 – R, A, S, Mil. 1673 – R, A, S 1680 – R, S, H, P 1730 – R, S, A, F, P 1774 – R, F
Leeward Islands	1678 – R, S, A, H, P 1707 – R, S, A, F, H, P 1711 – R, S, A, H, P 1717 – R, S, A H, P 1720 – R, S, A, F, Mil., P 1729 – R, S, A, F, H, P 1734 – R, S, A, P 1745 – R, P 1753 – R, S, A, P 1756 – R, S, A, F, Mil., P
Maryland	1701 – P 1704 – R, S, A, F, Mil., H, P 1708 – R, S, A, F 1710 – R, S, A, P 1712 – R, S, A, P 1755 – R, S, A, F, P 1762 – R
Massachusetts	1754 – R, S, P 1764 – R, S, A, H, P
Newfoundland	1675 – S,A,F,Mar., H 1676 – S,A,F,Mar., H, P 1677 – S,A,F,Mar., H, P 1698 – S,A,F,H,P 1699 1700 1701 – S,A,F 1706 – S,A,F,P 1730 – S,A,F,Mar., H, P 1735 – S,A,F,Mar, H, P 1738 – S,A,F,Mar., H, P 1739 – S,A,F,Mar., H, P 1751 – S,A,F,Mar., H, P 1755 – F, H 1757 – S,A,F,Mar., H, P 1774 – S,A,F,Mar., H, P 1775 – S,A,F,Mar., H, P
New Hampshire	1767 – R,S,A,F,Mar., P 1773 – R, S, A, F, Mar., P

	1774 – R,S,A,F,Mar. 1775 – R,S,A,Mil., P
New Jersey	1726 – R,S,A, P 1737 1738 – R,S,A,F,P 1745 – S,A,F,P 1772 – R,S,A,H, P 1723 – R,S,A,F,H,P 1731 – R,S,A,P 1737 – R,S,A,P 1746 – R,S,A,P 1749 – R,S,A,P 1756 – R,S,A,P 1771 – R,S,A,P
Nova Scotia	1762 – S,A,H,P
Rhode Island	1708 – R,F,Mil., P 1730 – R,P 1748 1749 – R,P 1755 – R,S,A,Mil., P 1775 – R,S,A,H,P
St. Vincent	1764 – R,A,F,Mil., H, P
Tobago	1770 – R,S,H, P 1771 June – R,S,A 1771 Sept. – R,S,A 1772 – R,S,A 1773 – R,S,A 1774 – R,S,A 1775 – R,S,A,P
Virginia	1623 1624 – R,S,A,P 1624 1625 – R,S,A,P 1634 – P 1699 – P 1701 1703 – S,A,Mil., P

Race = Race, S=Sex, A=Age, F=Degrees of freedom or servitude, Mar.= Marital status, Mil.=Military manpower, H=household or family, P=Political subdivisions

Reproduction of Wells (1975), *The Population of the British Colonies in America before 1776. Princeton, Princeton University Press.* 8-11

In addition to measuring colonial viability, the colonial counts also figured into political debates on European populations. For example, in England a disagreement existed between the physiocrats and the social reformers over the value of a high European population: was a high European population good or bad? Did a high population lead to a better or worse economy? More or fewer social ills? This debate included the colonies because they could be used as a means to decrease the European population in Europe through migration to the Americas. The central question of

the debate was whether the reduction of the European population should be characterized as positive or negative, which as a result, impacted how the colonies were characterized. If the reduction of the European population was positive, the colonies were characterized positively because they provided an outlet to reduce an overpopulated Europe that was rife with social evils brought about because of its high population. If the reduction of the European population was negative, the colonies were characterized negatively as a major strain on limited European labour resources (Wells, 1975, 15; Blum, 2002).

Trans-Atlantic Slave Trade

In addition to significantly more involved counts of people already in places colonized by Europe, various types of counts and descriptions of enslaved people transported through the Atlantic slave trade also exist and are an extremely detailed source of information about people collected by European powers during this period - albeit information collected for horrific purposes (Curtin, 1969; Slave Voyages, 2021). There are a multitude of excellent academic works that examine the trans-Atlantic slave trade (Dubois, 1903; Gilroy, 1993; Eltis and Richardson, 2000). In this section, I limit my discussion of the trans-Atlantic slave trade to the secondary literature that discusses the administrative tools used to count and classify the people enslaved by it. I am interested in the trans-Atlantic slave trade because it was very large in scale and temporal duration and was driven by complex political and economic administrative bureaucracies. As such, it is an integral part of the story of European classification and counting practices.

I would like to make two points that provide important context for my short discussion. First, the Atlantic slave trade was not only legal until the late 19th century (the last country to abolish slavery was Brazil in 1888), it was also incredibly profitable for those state- and private-entities involved (Curtin, 1969). This means that the people trafficked by the trans-Atlantic slave trade were treated and, most importantly for this discussion, *documented* as literal commodities that could be inventoried. The administrative infrastructure that developed around the trans-Atlantic slave trade was quite complex for this period and began with the initial colonial encounter by Christopher Columbus - a native of the city-state of Genova who had sailed on behalf of the Spanish crown (the wealthiest European power at the time). It brought about the establishment of an entirely new type of bureaucratic contract for the purposes of colonization with the Spanish crown (Scelle, 1910; Curtin, 1969; Alejandro Montoya, 2015). Specifically, the *assiento* was a

type of public contract between the Spanish state and a private individual. A specific colonial *assiento* was developed for the *adelantes* (explorers or literally ‘forwards’) to encourage the exploration and population of American territories, transport goods to the colonies and develop labour systems for the colonial economy. They also gave rise to an entire class of colonial merchants, known as the *assientistas*, who possessed these exclusive and (usually) very lucrative monopolistic agreements to traffic people (Scelle, 1910; Aguirre Beltrán, 1944).

Indeed, a very complex administrative and bureaucratic infrastructure developed around the trans-Atlantic slave trade from very early on that included royally-appointed mercantile trading companies (often with exclusive monopolies on services such as the Dutch West India Company), detailed European diplomatic agreements (including free trade and monopolies), predatory economic activities (such as pirating enslaved people from other colonial powers on the high seas which was very common and the method by which the English initially entered the slave trade), regulations and permissions (particularly around travel and entry at ports), prohibitions (particularly against smuggling or illegal trading of enslaved people which was ongoing throughout this period), economic duties and financial mechanisms (such as bonds) (Scelle, 1910; Aguirre Beltrán, 1944; Curtin, 1969).

This bulky administration stretched from West Africa across Europe to the Americas and produced an abundance of administrative documents that describe the people being captured, transported and sold, particularly their bodies, in considerable detail because import duties were collected on the people who were trafficked. These documents include “bills of lading, cargo manifests, port records, logbooks, invoices, quittances, trading-post inventories, account books, shipping recommendations, and orders from African traders” (Alpern, 1995, 5). For example, King’s (1943) archival work on the Palmeo records (an archive of Spanish slave trade records) notes an early, 1557 Spanish colonial *cedula* (administrative order) that explicitly mandates all slave trading ships landing in all Spanish colonies to register with an authority, hold a license for all the enslaved people transported, submit themselves to inspection by a colonial authority, and includes strict penalties (imprisonment) for non-compliance.

Secondly, many depictions of the trans-Atlantic slave trade tend to focus on the 18th and 19th-century British and French slave trade. However, this was the point when the trade reached its zenith. It is important to note that the trans-Atlantic slave trade began with the Spanish and Portuguese empires and included a variety of other European powers (Dutch, Swedish, Danish).

Although it is a complex historical phenomenon, one of the major reasons for the first wave of the trans-Atlantic slave trade was a demand for labourers brought about because of the deaths of very large portions of the American and Caribbean indigenous populations due to the introduction of novel diseases, war and/or brutal labour exploitation. The Spanish, who were the major colonial power in the Americas, had to look elsewhere for new sources of human labour to exploit for the colonial mines and plantations that they were establishing (Beltrán, 1944; Curtin, 1969). The Spanish had no significant trading connections with the continent of Africa, but the Portuguese did, having established military forts and trading posts along the north and west African coasts from the 15th century onwards. What's more, the Portuguese had already begun trafficking small numbers of people into Europe (Portugal) before 1492 (Curtin, 1969). Portuguese traders were the first *assientistas*, traders given monopolistic contracts by the Spanish kingdom to traffic people from Africa across the Atlantic as well as certain types of goods. Historical records indicate that from the early 16th century onwards, the Iberian slave trade was already trafficking hundreds of people across the Atlantic to ports in Latin America (current day Mexico, Brazil, Venezuela, Bolivia, Peru) and the Caribbean (Cuba, Puerto Rico) (Curtin, 1969). The relative participation of European powers in the Atlantic slave trade over the next four hundred years maps roughly onto the different waves of colonization in the Americas, Africa and Asia as well as onto waves of economic supremacy in historical slave trading relationships with the continents of Africa, Asia and Arabia as well as the broader spice trade (Curtin, 1969; Arrighi, 2007).

Who did the work and how did they do it?

Colonial Censuses

The importance attributed to the colonial counts is reflected in the status of the people instructed to conduct them and testify to their veracity – a ritual not described in the secondary work on European population counts (Dupâquier & Vilquin, 1976; Wells, 1975). Whereas in Europe, the work of counting was often delegated to small town officials, priests and people of lower professional and social standing who often did the counting as part of some other work (grave digging, delivering the mail, etc.), in the colonial context, the work of counting was often delegated to the highest ranking military officials or government officials who, in some cases, had to swear a solemn oath attesting to the validity of the counts. Whether or not these higher-ranking officers

actually did the counts or delegated them to some lower ranking official and then attested to their validity does not negate that the fact that they were mandated to do them - suggesting that more state attention and social authority were invested in the colonial counts. Similar protocols (ex: official oaths, aristocrats mandated to do counting) are not discussed in the secondary literature on European population counts.

In the colony of New France (present day Québec roughly), for example, it was the first colonial Intendant himself, Count Jean Talon (a French aristocrat), who was personally mandated with counting the population. He received the directive to “*visiter toutes les habitations les unes après les autres pour en reconnaître le véritable état, et ensuite pourvoir aussi bien qu’il pourra aux nécessités qu’il y aura remarquées*”³⁸ and is reported to have gone door-to-door himself collecting the information (Dupâquier & Vilquin, 1976, 93; Thornwaldsen, 2017). Beginning in 1665, annual censuses of all colonial inhabitants of New France were requested by the French monarchy and Talon established the early census infrastructure in New France (Dupâquier & Vilquin, 1976, 93-94; Thornwaldsen, 2017).

In the French Caribbean, the counters were similarly prestigious. In Saint Domingue (current day Haiti), archival analysis of colonial ordonnances suggests a rigorous counting process that included multiple levels of verification and ascended the hierarchical chain of command to the top level. The militia captains of districts, in concert with a “Counselor of the Superior Council”, were responsible for counting all heads of households without exception and generating a list with predefined categories that linked enslaved men, women, children and white servants to the colonial male head of household’s family name. In the case of enslaved people, the militia captains would attribute ages to all people who they believed to be between 13 to 60 years old presumably as an indicator of their labour, military or reproductive capacity. These counts included all colonial and enslaved people; however, a special list was generated exclusively for the tracking of enslaved people (Dupâquier & Vilquin, 1976, 93-97).

Once the counts were collected, the surgeons, “economic masters” and “white commanders” - presumably heads of the colonial administration - had to attest to the veracity of the contents of the list by swearing an oath that included strict monetary and professional penalties for lying. The slave count list is reported to have been posted in each quarter in very public places

³⁸ Translation: Visit all of the inhabitants one after the other to recognize their true condition and then provide as best they can for the needs they notice.

so that they could be viewable to all members of the literate public presumably as a mechanism of surveillance and control over enslaved people (Dupâquier & Vilquin, 1976, 94-97).

In the English colonial context, the people who counted tended to be local government officials or clergy who appear to have counted by county or parish (whatever was relevant). Like the French case, the governor of the colony was responsible for collecting and tallying the results of the counts which were often represented as a table of one or two pages (Wells, 1975, 19). English colonial counts sometimes appear to have been estimates because the numbers reported are largely 0s and 5s, although occasionally words like “many” and “few” are used as well (Wells, 1975, 19).

The categories typically used by the colonial censuses centered around race, sex and age. They also reflect differences in European colonial approaches, particularly legal and social customs regarding the inheritance of enslavement or freedom. In the English colonial context, race was defined as a binary: ‘black’ or ‘white’. People who were defined as black for the purposes of these counts were automatically assumed to be enslaved and difficulties are reported to have arisen around how to count and categorize free black people in the North, illustrating the centrality of the institution of slavery to these racial designations (Wells, 1975, 39). Likewise, it is important to stress that while there were always very large populations of indigenous people all over the Americas, they were often not counted because they were believed to be ‘outside’ of the jurisdiction of the European colony. Likewise, one would imagine there would have been a strong incentive for indigenous groups not to have wanted to be counted by a hostile colonizing power (Wells, 1975, 38-39).

For colonial counts related to the military, age and gender were the most common criteria because they decided who could be conscripted into the military or not. The two most common age categories were adult and child, defined by the (perceived) ages of 13 and 60 (Wells, 1975, 34-35). However, it is worth stressing that because standardized records of birth did not exist during this period, these ages were attributed to people by the people doing the counting and all sorts of strategies to evade conscription are reported to have been used. Those who were being counted sometimes objected to the counts on religious grounds, citing Biblical passages that presented the census as the mandate of the devil. They are reported to have believed that participation in the census was demonic and would result in a curse of plague (Wells, 1975, 20-21).

The French colonial censuses or descriptions included slightly different social categories but also tended to focus on race. In Saint Domingue (Haiti) leading into the Haitian and French revolutions, the major categories often discussed in the secondary literature include *grands-blancs* (big whites), *petits-blancs* (small-whites), *sang-mêlés* (mixed blood) and *esclave* (slave) (James, 1938; Wingfield and Parenton, 1965; Stein, 1981). However, one of the most extensive descriptions of Saint Domingue during this period, the Moreau de Saint-Méry's *Déscription topographique, physique, civile, politique et historique de la partie française del'isle Saint-Domingue* (1789), includes a much more complicated breakdown of racial categories including a very elaborate racial typology as well as a kind of gendered racial arithmetic. These categories include white and black, but they also include a number of other terms: *mulâtre*, *marabou*, *quarteron*, *grisse*, *queteron*, *sacatra*, *métis*, *mamelouc* and *sang-mêlé*. All of these terms have feminine and masculine forms which influence which racial category the child produced by the union of two of these groups would yield. These categories and combinations reflect laws of inheritance of slavery and freedom (James, 1938; Wingfield and Parenton, 1965; Stein, 1981).

Trans-Atlantic Slave Trade

In addition to the racially based colonial counts, the counting and classifying practices employed by colonial powers in the trans-Atlantic slave trade are particularly important for discussion because they are the most codified and extensive system of social valuation and quantification that existed during the period under investigation in this chapter. These counts are perhaps the most literal examples of Poovey's (1995) double-entry book-keeping and her critique of double-entry book-keeping as the substitution of "precision for accuracy" applied to people because people were literally treated and most importantly, *administered* by European state apparatuses as commodities.

Curtin (1969) in his very useful work, *The Atlantic Slave Trade: A Census*, describes various types of administrative records detailing the trans-Atlantic slave trade. They include port records of the entry of enslaved people into the Americas (apparently port records from African ports are quite rare) taken by colonial authorities for the purposes of taxation, shipping records taken by slave traffickers and multi-annual aggregate estimates generated by various officials. The counts were performed by a variety of people involved in the trafficking of enslaved people. Ship

captains, slave traders, travelers, supercargos³⁹ and various colonial officials were all involved in the counting of the people who were trafficked.

Firstly, the early Iberian slave trade is of interest from the perspective of social counting because it developed its own ‘measurement system’ of enslaved humans based on an idealized standard of forced labour (Curtin, 1969; Gómez, 2021). The *piezas de Indias* (‘pieces of the Indies’) was a prominent economic measurement system developed by the Iberian trans-Atlantic slave traders to evaluate and ‘count’ enslaved people from both Africa and the Americas. The name itself was derived from the economic practice of paying for enslaved people with *pieças* (*piezas* or *peças*, in Portuguese) of fabric (Gómez, 2021). It was common enough in the Iberian slave trade that it was the measurement language used to draft a variety of legal and economic accords pertaining to slavery as well as to determine the tariffs traffickers had to pay to the crown in order to traffic kidnapped people. It was widely used in the Iberian slave trade to practically define, value, ‘count’ and trade people trafficked from West Africa to the Americas (Curtin, 1969; Gómez, 2021; Alejandro Montoya, 2015).

Like many of the historical population counting systems discussed in this chapter, the *pieza de India* system absolutely *did not translate the presence of a person to the count of one on the page*. Instead, it was a completely idealized measure referring to the maximum amount of work an adult, healthy, tall, enslaved, African man was believed capable of by traffickers (Alejandro Montoya, 2015; Gómez, 2021). Here again, the presence of one person did not translate to a count of one on the page. It worked by valuing all trafficked people against an idealized standard fabricated by slave traders. Any physical or behavioural characteristic that was believed to diminish that idealized capacity for labour was subtracted from the *pieza* in *cuartas* (which means ‘quarter’ but was equivalent to 1/7th of a *pieza*). For example, if an enslaved person was a woman but otherwise deemed ‘acceptable’, one *cuarta* would be deducted from the *pieza* resulting in a payment of 6/7ths of a *pieza*.

Perhaps there is no clearer illustrations of Poovey’s (1995) substitution of precision for accuracy as well as the conflation between ‘natural’ and ‘social’ systems of measurement than this one in all its brutal absurdity, where the units of measurement for both *height* and *economic value* are a slave trader’s fantasy of the exploitation he could extract from a young man in exchange for pieces of fabric. Clearly neither a *pieza* nor a *cuarta* existed as physical objects in reality, yet they

³⁹ People paid to ‘supervise’ the process.

were the literal currency of the Iberian slave trade, social valuation and exploitation codified in the ‘precision’ of numbers.

Due to the completely subjective and idealized origin of the *piezas* system and its association with colonial import tariffs, the strong tendency for people to die due to the horrific conditions in which they were kept on the ship and the tendency to count multiple people as one *pieza* (ex: three children could be counted as one), the Iberian trans-Atlantic counts enumerate people oddly given the peculiarities of the *piezas* system which counted only young, healthy, tall men with all their limbs as ‘1’ (everyone else was assigned a fraction)(Curtin, 1969). Further, there was considerable incentive for different counters to either exaggerate or underestimate the number of people in counts. If the merchants were counting and paying tax on the *piezas* transported, there was clear incentive to underestimate the number of people transported by whatever means possible (for example, by claiming that people were sicker, shorter, much younger, more female, much older or dead). Conversely, if the colonial port authorities were counting, there was a clear investment in overestimating the number of *piezas* in order to collect more tax (for example, by claiming that people were healthier, taller, more masculine, younger, older or alive).

The later English and French instalment of the slave trade, which became prominent in the 18th and 19th centuries, appears to have done away with the *pieza* system, although there are continuities in the information collected. The online archive, Slave Voyages, has accumulated and collated information from various English slave registers and has digitized examples of slave ship registers. In these registers, the information collected included name, age, sex, height and other remarks related directly to the perceived “quality” or unique characteristics of the person’s body that includes tattoos and scars - ways of ‘reading’ the body very different from other descriptions of people during this period. For example, one entry describes a man with “cuts on cheeks, back and belly”, “cuts all over” or “tattoo on the belly” (Alejandro Montoya, 2015; Slave Voyages, 2021)

*Portuguese Johannes "Bella" Steyer: Register of followers
Native of Africa captured on board the said Ship by the*

No.	Name	Sex	Age	Stature	Description
037	Ammode	Man	24	5 3	cuts on ea. side of Face
038	Guyjar	"	25	5 7	cuts all over Body
039	Ookay	"	21	5 7	do do
040	Ajiborey	"	19	5 6	do do
041	Adoy	"	18	5 3 1/2	do do
042	Obadday	"	23	5 6	do do
043	Faxolay	"	25	5 9	Tattooed on cheeks & cuts on Face
044	Jinashan	"	26	5 6	cuts on Face and belly
045	Lugoloh	"	22	5 6	Large cuts down belly and face
046	Olloo	"	21	5 5	cuts on face and belly
047	Lyenosogood	"	24	5 7	cuts on belly
048	Lanfanguish	"	25	5 6	do do and Face
049	Ahaluyloh	"	23	5 4	Tattooed with small spots
050	Ochome	"	24	5 5	cuts on face and belly
051	Ahwolley	"	25	5 5	cuts on belly and arms
052	Hyenach	"	22	5 8	cuts on belly, arms and face
053	Kamilah	"	26	5 5	cuts on Face
054	Ahhittylah	"	21	5 9 1/2	cuts on face and belly
055	Lopak	"	19	5 4	Tattooed on arms & do
056	Ahhaddies	"	20	5 0	cuts on face, arms & belly
057	Ahhabbee	"	24	5 3	do do do
058	Morroo	"	28	5 6	do do do
059	Fattie	"	26	5 6	cuts and Tattooed all over
060	Oyobee	"	20	5 5	cuts on face and belly
061	Grotelaf	"	21	5 5	do do do
062	Ahjuwah	"	28	5 10	do do do
063	Ahgrubeds	"	19	5 7	do do do

Figure 8: 18th century English slave trade record, *Slave Voyages*

Interpretation

Both the colonial counts and trans-Atlantic slave trade are notable because they were conducted more regularly, with greater standardization across categories and greater detail than the Europe-based counts examined in this chapter. The object being counted, documented, and valued was the human body. In terms of the categories used, it is also worth remarking that the social category of race features heavily in the colonial counts but not at all in European counts surveyed in this chapter from the same period. The people tasked with doing the counting tended to be high-ranking colonial administrators or military officials who tended to carry out the counts as part of some

other work, suggesting greater importance was attributed to the counts. That said, even for these more frequent and detailed counts, there are numerous ways that these counts as well did not reflect the people they were counting but systems of social value and function as well as the volition of the people being counted. The counting system used by the *piezas* system of body valuation demonstrates this well in that a count of ‘1’ referred only to a person whose body was valued for labour.

Summary and Conclusion:

In this chapter, I investigated how European powers historically counted and categorized human populations between the 16-18th centuries. I did this because I am using Desrosières’ (2008) historical sociology of quantification to frame both my analysis and the structure of my dissertation. Within this framework, part of the practice of statistics must be understood as the construction of the administrative infrastructure and work routines that are put in place to generate population lists, both the techniques used to generate the lists and the work protocols and administrative infrastructure put in place to collect the information. I have divided my historical analysis of list-making into two chapters. While pre-19th century and 19th century lists share similarities, I argue that there are important differences between the way that lists were generated in these two periods.

I focused my examination of 16-18th century population counts on plague counts, parish registers, hearth counts, colonial censuses, and the trans-Atlantic slave counts. The rationales for these counts are diverse and include public health, taxes, taxation, religious/social conformity and control, military conscription, conquest of territory, enslavement of people and labour exploitation. They were mandated and conducted by various administrative infrastructures including the Catholic or Anglican Church, state officials (sheriffs, constables, etc.) of the city-state or kingdom, military officials, colonial administrators or some combination of these administrative bodies. Generally, the people doing the counting were a mixture of people counting as they performed some other role (ex: gravedigging, tax collecting, colonial administrator, port entry person). Only the Searchers of the plague counts were specifically mandated with counting people as their vocation. This is one of the important differences with the 19th century counts that I will elaborate on in the next chapter.

Finally, there are some additional differences that I would like to stress between counts conducted/carried out by European powers of people living in Europe and counts by European powers of people not living in Europe. As I mentioned at the beginning of this chapter, there is a tendency for the existing academic literature on European population counts to address only one type of count conducted in one location (ex: the parish registers of France). One of the major contributions of this chapter is that it puts the historical literatures on historical European population counts done in different geographic locations into conversation with one another. By doing this, I was able to remark on differences between counts done of populations in Europe and populations outside of Europe. Namely, the frequency, rigor, scope and importance attributed to counts done of people in non-European locations were all much higher, particularly of people in the trans-Atlantic slave trade. Although not all people were counted, the people that were counted were counted much more regularly using a much more standardized set of characteristics.

I argued that population list-making practices by states are a *social and historical phenomenon*, a qualitative technique that was refined over time. This is evident in the *lack of* standardization of social categories in 16-18th century lists, the generally sporadic nature of their collection as well as the overwhelming absence of strategies to interpret them. Indeed, in some of the oldest lists, like the plague counts, short anecdotes - and not individual words - are used to communicate information about cause of death. For, 'causes' of death (versus characteristic of the deceased) are not at all self-evident to the people doing the counting (Bowker and Star, 2000). This indicates that population lists or the enumeration of the people by discrete one-word social categories in which all members of a given population are supposed to fit had to be developed over time as both Desrosières (2008a) and Foucault (2002a) indicate.

CHAPTER 4: 19th-CENTURY LISTS AND LIST-MAKING: THE METRIC SYSTEM, STATISTICAL BUREAUCRACY AND THE AVALANCHE OF PRINTED NUMBERS

“It is not enough to know the strength of the population and the number of people, if the categories of individuals who make it up in terms of their sex and age, do not allow us to appreciate their needs and the services that can be expected from them....Whoever wants to lead a political body has to know the amount of force at his disposal, which varies according to the use that one wants to make of it” (Moheau, 1778, p.42)

The well-known scholar of nation and nationalism, John Breuilly, notes that there is “one great absence” from any political map of Europe before the late 18th and early 19th centuries: the nation-state (2013,149). Leading up to this, Europe - and the parts of the world that had been colonized by Europe at that time – had been governed by multi-ethnic dynastic states (Breuilly, 2013; Labbé, 2019). According to the modernist understanding of the nation-state and nationalism, the late 18th and 19th centuries saw the collapse of feudal forms of political organization across the world in favour of nation-states that were premised on the political *rhetoric* of nationalism.

In this literature, nationalism is a political and ideological movement that suggests that the nation is a natural and unitary group of people belonging to a specific land and shared culture, a notion that is either explicitly or implicitly present in all modernist definitions of nationalism that I examined in Chapter 2 (Greenfield, 1992; Breuilly, 2013; Gellner, 1997; Hobsbawm, 1979). The modernist literature suggests that nationalism is *not* a social or historical reality but a *political rhetoric* - divorced from political practice - that was used by already powerful states to *expand their territory by creating (inventing) and maintaining* a common culture, language, origin and, as I will argue in the rest of this chapter, *scientific measurement* system of the natural and social world (Hobsbawm, 1979; Gellner, 1997). Nationalism *creates* rather than *reflects* the nation and it relies on a complicated bureaucratic infrastructure to do so. In the remainder of this chapter, I examine some of these institutions and their connection to nationalism and statistics.

Purpose and argument of this chapter

This chapter continues my examination of Desrosières’ (2008a; 2008b) first stage of the statistical process (social categorization and list-making), this time in the late 18th and 19th century context.

This is interesting (and different from the previous chapter) because the late 18th and 19th century saw the establishment of complex bureaucratic systems built on the rhetoric of nationalism as well as the mass adoption of the national census (Torpey, 2018; Caplan & Torpey, 2001; Brubaker, 1992). Both these bureaucratic systems and the national census techniques were intended to transform heterogeneous or regional *peasants* into national *citizens* (Weber, 1977; Tomes, 1996; Brubaker, 1992; Hobsbawm, 1992). This was accomplished in a variety of ways, including the imposition of a common language, the cultivation of origin myths and identity documents resulting in what Hacking (2013) has called an “avalanche of printed numbers” (2).

In this section, I examine 19th century approaches to population list-making. First, I very briefly develop the scientific and political *weltanschauung* surrounding the significant changes made to list-making practices during the 19th century. I do this by examining the influence of the metric system of measurement to thinking on natural and social measurement as well as post-revolutionary changes made to the academic system that increasingly favoured empirical science and mathematical understandings of the world. Second, I examine the *establishment of European statistical bureaus* during the 19th century. In the process, I highlight Quetelet’s influence on the organizational structure of various European and North American statistical bureaus and discuss some of the debates on organizational structure held by 19th century statisticians. Finally, I end with a discussion of the *national censuses* that were founded during this period paying particular attention again to Quetelet’s influence on the census form.

I make two **major arguments**. First, following Thornwaldsen’s⁴⁰ (2017) historical work on the global development of the population census, I argue that the late 18th and 19th centuries underwent a period of rapid institutional refinement and technical standardization that allowed for population counts to be conducted across larger geographic areas with more frequency and relative rigor than previous population counts. I follow Thornwaldsen’s (2017) characterization that this period of time marked the development of ‘modern’ census taking techniques that were conducted by centralized national statistical bureaus using standardized, nominative (meaning that detailed information about the people being counted as opposed to just counting them) census forms. Second, following Desrosières’ (2008a; 2008b) framework which I laid out in Chapter 2, I argue that STS understandings are essential for understanding the statistical process because they

⁴⁰ Thornwaldsen (2017) argues that “the 18th and first half of the 19th century were a transitional phase in census taking” (7).

demonstrate the ways that topics such as organizational structure, the social character of workers and worker compensation were active concerns of 19th century statisticians who saw these topics as an integral part of the data collection and integrity (Desrosières, 2008a; 2008b). As mentioned in Chapter 2, following thinkers like Anderson (2006), Hobsbawm (1979) and Desrosières (2008a; 2008b), I characterize statistics and the census – one of the most important components of 19th century statistics - as an underexamined approach to 19th century nation-building. As my inquiry is historical and uses an STS framework, some basic context regarding the broader social, scientific and academic infrastructure is necessary to contextualize my analysis, which follows.

In the following section, I develop the *weltanschauung* around the emergence of 19th century statistics. The point of this chapter is not to suggest a linear progression of historical developments (i.e. the IIS was a direct result of the metric system) but to identify general trends leading to the foundation of the IIS or what Deleuze and Guattari (1980) or Latour (1987) might call an “*assemblage*” that was discussed in the Chapter 2. This provides the reader with important historical context regarding 19th-century scientific, technological and bureaucratic organization which are obviously much different from the current day. It also allows me to clearly identify influences in my subsequent empirical examinations.

The section is structured in the following way. First, I examine the metric system project which was introduced by the French state during the revolutionary period. In particular, I focus on its ambition to impose a standardized measurement system derived from natural law across the French territory – an ambition that is shared by the IIS statisticians that I will examine in Chapter 6. Second, I look at the revolutionary reorganization of the French academic system brought about by Napoleon that privileged math and physics and sought new applications for mathematical techniques. Third, I discuss Adolphe Quetelet’s early model for statistical bureaucracy, the Belgian Central Statistical model as well as some preliminary comments on the modern national census that was introduced during this period – a discussion I will expand on with novel empirical material in Chapter 6. This is important because many histories of statistics tend to overlook or undertheorize the organizational structure of statistical bureaus or treat them as an incidental part of the statistical process. However, the historical record indicates that the question of the organizational structure of statistical bureaus was frequently and often vehemently debated by many of the premier *statisticians* of the day who saw it as a key issue for the international standardization and comparability of data – something I will show in Chapters 5 and 6 (Koren,

1918; Chatterjee, 2003). As Prévost and Beaud (2012) astutely observe, “entering the age of numbers also meant entering the age of bureaus dedicated to the collection and dissemination of numbers” (70).

Scientific and political *weltanschauung*: the metric system and new applications for mathematics

The “long 19th century”, as Hobsbawm (1962) calls it, was marked by a number of significant developments in the scientific and academic spheres. In this section, I briefly examine two developments that provide necessary context for understanding the 19th century statistical project: the metric system and the post-revolutionary reorganization of the academic system.

The metric system

Standardized measurement is essential for any scientific project, and statistics in particular. As noted in Chapter 2, discrete social categories must be consistently applied according to a set of rules - ideally by a disciplined set of workers - for any subsequent analysis to be meaningful or correspond to what is happening. The late 18th and 19th centuries were marked by a strong aspiration for the implementation of standardized measurement systems of both the natural and social world by European state apparatuses, particularly France. This impetus was informed by Republican and Enlightenment values, particularly secularism, rationality, universality and objectivity. The metric system of measurement is likely the best-known measurement system to emerge during the late 18th and 19th centuries in France and then other countries. Extremely ambitious in scope, it was introduced slightly before the French Revolution and was intended to replace the approximately 250,000 *local physical measurement systems* that existed previously in the French kingdom alone (Morimune, 2009, 103; Février, 2012; Alder, 2002). These roughly quarter of a million pre-metric measurement systems were very subjective and prone to all sorts of contention. They often used human body parts (ex: *pied* for length) or human and/or animal physical capacities (ex: consumption capacity or physical endurance) to measure volume or length (Porter, 1995, 22-4; Février, 2012, 2). As an example, the *galopin* unit of measurement assessed a volume of liquid and was defined as the amount of wine (not water) a person could drink over the course of one meal. A *picotin* was a measurement unit used for weight. It was defined as the

equivalent of one horse's ration of oats (Février, 2012, 2). If conversions between measurement systems needed to occur or a dispute over a measurement occurred, a "master of reckoning" – a person with knowledge of multiple measurement systems - could be called in to 'resolve' the dispute. No one system of measurement could claim to represent nature better than another (Alder, 2002; Février 2012).

The metric system was brought in to replace these systems and was simultaneously a scientific and political project. Scientifically, the metric system was an extension of the Enlightenment project and sought an elite, scientific language that was derived from nature (Morimune, 2009, 103; Alder, 2002). Condorcet, for example, introduced the meter to the National Assembly as an expression of "*le zèle éclairé de l'Assemblée nationale pour l'accroissement des lumières et le progrès de la fraternité entre les peuples*"⁴¹ (26 mars 1791). The development of the metric system was commissioned by the French Academy of Science in 1790, slightly before the revolution, and the survey work was done while the revolution was in full effect (Alder, 2002). In order to be as objective as possible, the meter was defined using the meridian lines of the Earth because they could be said to be directly derived from Nature and could, therefore, be presented as an objective, authoritative and 'natural' measurement standard. Further, the meter would be defined by the field of astronomy, which was considered the most rigorous and authoritative science at the time (Dear, 1995; Shapin, 1996; 2010; Alder, 2002). The empirical survey work for the metric system was done by two astronomers, Jean-Baptiste-Joseph Delambre (1749-1822) and Pierre-François-André Méchain (1744-1804), who were tasked with measuring the meridian lines that stretched from Dunkurque to Barcelona to provide a 'naturally'-derived basis for the meter standard. They published their findings in *Base du système métrique décimal ou mesure de l'arc de méridien entre Dunkerque et Barcelone*⁴² (1806) (Alder, 2002; Février, 2012; Williams, 2014).

Politically, the metric system is inextricably tied to the political and economic ambitions of the French Revolution. It is important to note that it was developed and first introduced as the national measurement system of France, first introduced in 1795 shortly after the Revolution and mandated by law in 1840. It was only later adopted by most other nation-state (Great Britain and

⁴¹ Translation: The enlightened zeal of the National Assembly for the increase of enlightenment and the progress of fraternity between peoples.

⁴² Translation: Basis of the metric decimal system or the measure of the meridian arc between Dunkerque and Barcelona.

the United States remain two notable exceptions), in some cases, well into the 20th century⁴³. The meter was never considered just a scientific project, even by its developers. It was intended as a unifying, standardized system of measurement derived directly from nature, “*qui puisse convenir à tous les peuples*”⁴⁴, particularly their *systems of trade* (Condorcet, 26 mars 1791). The idea was that a measurement system directly derived from nature (meridian lines) was *not discretionary*, meaning that it would yield the same measurements regardless of *where* they were taken or by *whom* because it was based on a natural constant. It could not be manipulated in the way that feudal measurement systems had historically been. For example, the ration of oats a horse eats in one sitting is obviously highly variable depending on the horse and its circumstances. Measurements taken with the metric system were based on a natural constant and, because of this, could also be standardized across time and place. The standardization of the measurement of volumes of liquid and weights of grain was essential for the development of an integrated economy because it allowed the same quantities of goods to be exchanged throughout French national territory, allowing for the *standardization* and, more importantly, *centralized control* of trade by the state (Alder, 2002; Février, 2012). This was a very important component of consolidating the power of the new liberal state and can be read as a direct retort to the arbitrary tyranny of feudalism and its approximately 250,000 unstandardized physical measurement systems.

The metric system provides useful context for understanding the formation of statistical bureaus and practice of 19th century statistics because one of their major goals was the standardization of social measurement systems, specifically national social categories, so that results of statistical inquiries were the same within and across countries. As the analysis in Chapter 6 shows, in some cases, the metric system is *directly referenced* in the IIS Bulletin not only as a model for the ISI’s statistical practice but as the necessary basis for the ISI’s entire statistical project. It is important to recognize that when Quetelet convened his first statistical congress in 1853, only a handful of countries had legally adopted the metric system (not to mention

⁴³ As an example, the Dutch (1816-17) were the second adopters of the metric system after France followed by the Belgians (1830). The adoption of the metric system was galvanized by the Treaty of the Metre in 1875 that cemented the metric system as an *international* system of weights and measurements (Cox, 1958). By 1887, the metric system had been mandated by law in the following places: Argentine Republic, Austria and Hungary, Belgium, Bolivia, Brazil, Chile, Colombia, Denmark, Ecuador, France and colonies, Germany, Greece, Italy, Mexico, Netherlands, Norway, Paraguay, Peru, Portugal, Romania, Spain, Sweden and Switzerland. Further, it was optional by law in the following places: Dominion of Canada, Great Britain and Ireland, Persia and the United States (Scientific American, 1887, 260).

⁴⁴ Translation: ...which can suit all people

successfully implemented it). If statistics, particularly of phenomena related to natural and economic life, were to measure the same thing *within* (pre-metric measurement systems tended to be regional, un-standardized and, in some cases, linked specifically the thing being measured) and *between* nation-states, a common measurement system had to be imposed. The volume of the French regional *galopin* of wine was not equal to the volume the Germanic regional *ahm*⁴⁵ of beer, was not equal to the Spanish regional *almud* – themselves all variable between individual measurements of the same unit. As noted, there were over a quarter of a million measurement systems in the kingdom of France alone. An international statistical project without a standardized measurement system was an exercise in futility. For this reason, the adoption of the metric system was an integral part of Quetelet's initial 1853 statistical congress that led to the formation of the IIS to such an extent that the IIS wrote the metric requirement into their initial organizational resolutions; IIS members had to report their information in metric units, no other measurement systems were allowed (Cox, 1958). This emphasis continued throughout Quetelet's early statistical congresses before the formal founding of the ISI:

In the following year (1860) metric advocates scored a resounding triumph at the fourth International Statistical Congress, a meeting in London. Resolutions were passed requesting delegates from non-metric nations “to ‘urge’ adoption of this system upon their governments, asking that future government statistics be reduced to metric terms, and proposing an international committee to determine “the best means of overcoming the obstacles that may exist in any country to the establishment of the metrical system” (26).

The world's statisticians thus had unreservedly joined the metric movement (Cox, 1958, 365).

Napoleon's reorganization of the academic system

In addition to changes in scientific measurement systems, the French Revolutionary period also ushered in significant changes to the French academic system, most dramatically during Napoleon's reign. An understanding of the French academic system during this time provides important context for why a shift towards quantitative analysis of social populations became a priority for some of the most influential French thinkers of the revolutionary period. It also provides biographical context for one of the primary thinkers, Pierre-Simon de Laplace, whose work I examine further in Chapter 5. Laplace had a very close relationship with Napoleon and

⁴⁵ An ‘ahm’ is an old Germanic measurement exclusively intended for the volume of beer and wine only.

was one of the leaders of the French academic system in the pre- and post-Revolutionary governments.

Although we often take free primary and secondary education for granted, it is important to recognize that public primary education was not always mandatory for the general population nor was it properly organized or funded when it was mandated (Pearce Williams, 1953; Palmer, 1974). During the *Ancien Régime* in France, public education was delivered by the church and had been mandated for all children up to the age of 14 by the *Ordinance of December 13, 1698*. This Ordinance, however, provided no funding for these schools and only approximately 350 educational institutions, of which only 33 were universities (funded through aristocratic philanthropy and an ecclesiastical tax) are estimated to have existed in France shortly before the revolution. These establishments offered either six or eight years of education to approximately 50,000 *men* (only) between the ages of ten to twenty years (Palmer, 1986; Pearce Williams, 1953).

As the revolutionary government seized the assets of the monarchy and church, this system of education ended and discussions around the structure, content and delivery of a system of primary education became one of the definitive issues of the French revolutionary period (Pearce Williams, 1953, 312). On the 3 *Brumaire Year IV*, a decree was introduced by the French revolutionary government that created the *École centrale* system, based on the ideas of the French *Idéologues*, which mandated primary school (with a set curriculum) be established in every French *Département* - a system that ultimately failed (Palmer, 1986; Pearce Williams, 1953). The creation of the French primary education system that endures to this day is generally attributed to interventions of Jules Ferry (1832-1883) in the later *Loi du 28 mars 1882* which made the French primary school system compulsory and removed clergy and religious ideas from education in order to make the system *laïque* (French Senate, 2021).

Before the Revolution, the university system of the *Ancien Régime* had been organized around salons and the institution of the *Académie de France*. The *philosophes* were considered to be the most prestigious intellectual figures and the *lettres et beaux arts* that they produced were highly esteemed. During the revolutionary period, Napoleon, in particular, made very significant changes to this hierarchy and - in a direct snub to the old *philosophes* who were associated with the aristocratic traditions and values - turned the previous academic system on its head (Heilbron, 2006, 175, 179). Napoleon strongly believed in the promise of science and its applications and reorganized the French academic system to prioritize the sciences. Specifically, he was driven by

the hope of using quantitative techniques to formalize the study of all facets of natural and human life in order to understand and control them (Heilbron, 2006, 185). He abolished the *Académie de France* in 1793 (the most prestigious French academic institution of the *Ancien Régime*) and established the *Institut de France* in its place in 1795 (Gillespie, 1997, 166; Hahn, 2005, 124; Heilbron, 2006, 179). The *Institut* was intended as the Republican answer to the Academy – driven by the values of merit, objectivity and civic duty – in opposition to the aristocratic ones that had existed before (Gillespie, 1997, 166).

The *Institut* was divided into three separate and hierarchically ordered classes or *cours*. The first class was mathematics and physics and included chemistry (Hahn, 2006, 124). The second class included the entirely new domain of “moral sciences and politics” (headed by François Guizot) while the most prestigious form of knowledge-generating in the *Académie*, the *lettres et beaux arts*, was relegated to the third and lowest stream (Heilbron, 2006, 176). The premier class of mathematics and physics was further divided into three separate streams: 1) a stream similar to “pure mathematics”; 2) a stream for the mathematization of new branches of science; and 3) new forms of math linked to new types of applications (Heilbron, 2006, 186). Pierre-Simon de Laplace and chemist, Antoine Lavoisier (1743-1794), headed the first class of mathematics and physics and were both responsible for directing the latter two fields of math, particularly the mathematization of new areas of study, which in Laplace’s case, included the application of mathematical concepts to the study of the social sphere (Heilbron, 2006, 187).

The reorganization of the academic system during the revolutionary era provides crucial context for understanding the formation of statistical bureaus and the goals of 19th century statistical practice because it reorganized academic knowledge-generating systems and resources to explicitly privilege mathematical and scientific understandings of the world over philosophical or literary ones. The work that I discuss in Chapter 5, *Essai philosophique sur les probabilités* (Laplace 1825), was a direct outcome of this academic program and the broader political reorganization of the academy. It is also Laplace’s only work on the social sphere. (The rest of his oeuvre focused on mathematics and physics.)

The foundation of 19th century European statistical bureaus: the Belgian central commission model

In addition to changes in the broader scientific and academic *weltanschauung* which sought to standardize measurement systems across large geographic areas, another major difference that characterizes the project of 19th-century statistics was the foundation of *national* statistical bureaucratic infrastructure dedicated exclusively to the regular collection of social data. As Prévost and Beaud's (2012) illuminating work on statistical bureaucracies observes: "...we may say that entering the age of numbers also meant entering the age of bureaus dedicated to the collection and dissemination of numbers" (2012, 70-71).

The claim here is emphatically *not* that the 19th century invented statistical bureaucracies *ex nihilo* (indeed, Chapter 3 identifies different types of bureaucratic infrastructure that existed before the 19th century) but rather that the statistical bureaus of the 19th-century were comparatively larger and more formal, organized, professional and scientifically-oriented than earlier administrations. Specifically, in the 19th century the *scale* of the national populations being counted was much larger than previous counts, the *frequency* of their enumeration and the *political purpose* for their collection was significantly more ambitious, and counts encompassed more facets of life than they had been previously. All of this required considerably more complex state infrastructure and a dedicated professional class of workers trained to collect and analyze the data:

This continuous expansion of statistical artefacts can be described as a momentous epistemic transformation that has to a large degree displaced earlier authoritative forms of persuasion based on local and singular types of knowledge-often couched in literary form, with information of a more general and standardized character generally presented in a numerical guise. *But this transformation has also been political and institutional, in the sense that it has been made possible because of the ongoing increase in information-gathering activities carried on by governments and their agents from the early 19th century on.* The harmonization of weights and measures, the cadastral survey of the national territory, the advent of periodical censuses, the setting up of standardized procedures to record the basic vital events of each individual's birth and death, all partake to this multi-faceted enterprise, under the conjoined and yet distinct legitimacies of modern science and of the modern state. 'Evidence-based policy' may be of recent coinage - and it may very imperfectly describe the actual practice of governments - but the standard it sets coincides rather well with the pleas and arguments put forward, at various junctures, *by those who pushed for such an approach to the understanding and management of social and political issues and for institutions accordingly conceived to be set up* (my italics, Prévost and Beaud, 2012, 1).

Adolphe Quetelet is cited by many statistical historians as the primary advocate for 19th century statistics, particularly statistical bureaucratic infrastructure (Prévost and Beaud, 2012; Stiger, 1999; Desrosières, 2008a). Although a range of different views existed in 19th century statistical communities, Adolphe Quetelet's opinion dominated early 19th century thinking on the formation of many European statistical bureaus. A statistical department had existed in Belgium before his interventions, but he was a strong proponent of bureaucratic centralization, an approach which advocated the formation of *one* statistical bureau dedicated exclusively to the collection of *all* governmental statistical data (as opposed to a “decentralized” approach where each national ministry should be responsible for their own independent collection of statistical data). This was not just a scientific question but a political one because a centralized approach meant that the information collected by statistical offices would be standardized and controlled by a central office. A decentralized approach meant that each office would develop its own statistical program meaning that national data would not be internally comparable because different categories and approaches could be used by different regional offices.

Quetelet was a proponent of the centralized model because he thought that it would produce higher integrity data. He states this very clearly in his argument for a centralized bureaucratic structure:

To provide unity to the official proceedings, *we must bring them back to a common center*; it is necessary that the principal officials responsible for drafting the different branches of the general statistics, can meet and work together, *that they admit the same divisions, that they adopt, after careful review, the same terms and the same numbers to represent the same objects, that they leave no gap in the general tables, and avoid, on the other hand, duplication of effort*. The surest way to achieve this desired unity seems to be the creation, for each [nation] state, of a central commission of statistics, or any similar institution, composed of representatives of key departments (Quetelet quoted in Prévost and Beaud, 2012, 57).

In 1841, Quetelet centralized the Belgian statistical system so that all statistical data would be collected by one unit: the Belgian Central Statistical Commission (Prévost and Beaud, 2012, 56; Vanderstraeten and Louckx, 2020; Curtis, 2001). From 1853 onwards, he used the international statistical congresses that he organized - the predecessors to the IIS congresses analyzed later in this dissertation - to promote the Belgian Central Commission organizational model of statistics internationally (Vanderstraeten and Louckx, 2020; Curtis, 2001). His efforts were successful and, as Prévost and Beaud (2012) observe through their insightful historical empirical work on 19th

century statistical bureaucracies, the Belgian Central Commission model was adopted by a wide range of European nations throughout the 19th century including: Spain (1856), the Netherlands (1858), Sweden (1858), Prussia (1860), Austrian (1863), Russia (1863), Romania (1871), Italy (1872), Norway (1876) and France (1886)⁴⁶. As Prévost and Beaud (2012) remark, Belgium is a strange international model for statistics because it was a small country with limited economic and political influence. The international adoption of the Belgian Central Commission model has been attributed in part to Quetelet's international efforts to promote the use of standardized statistics by states (57-58).

Two observations about the formation of 19th century statistical bureaus are worth stressing. First, the formation of these 19th century statistical bureaus did not occur in isolation but was the product of a burgeoning 19th century statistical internationalism that was coordinated by specific groups of people and instigated largely by the 'proselytizer of 19th century statistics' or 'homo statisticus' himself, Adolphe Quetelet (Vanderstraeten and Louckx, 2020, 101). Nineteenth-century statistical bureaus were, therefore, *not* the product of individual states' efforts developed in isolation. Rather, 19th-century statistical bureaus developed *in direct conversation with one another*. Many were intentionally structured according to the *same organizational model*, the Belgian Central Commission model, that had been developed and heavily promoted by Quetelet to his peers. This was done intentionally *so that the same* categories and techniques could be used making the statistical results *intra-* and *inter-*nationally comparable, at least in theory.

This observation provides an important point of reflection for methodological nationalism. Specifically, the plan (again, the realization is reported to have been different) to impose standardized social categories and aggregate metrics *across* nation-states can be viewed as one of the ways that the global regime of nation-states was naturalized through the social sciences and social statistics, in particular. What is notable about this form of naturalization is that it uses social category standardization – the use of the same social categories across nation-states - *so that* aggregate metrics could be comparative and meaningful. The idea that the same social categories *should* be found in each nation-state is clearly a major *a priori* assumption and one that is based *not* on inductively-generated social categories (reflective of the social categories used by people

⁴⁶ These dates refer to the adoption of Quetelet's Belgian Central Commission model of organization and not the foundation of the departments of themselves which is why the dates listed here do not correspond to the dates listed on the following table.

to understand themselves and their environment) but on the *political goals of a nascent internationalism and the constraints of the knowledge-generating techniques themselves that was intended to 'reflect' - and arguably, 'invent' - them*. Further, given the *a priori* nature of these social categories, the question of *which* social categories were believed to be internationally omnipresent and useful for state administration becomes a very interesting question indeed. This observation provides context necessary for understanding the empirical analysis of the IIS in Chapter 6.

Second, it highlights the importance of *sociological understandings of the entire statistical process*, particularly the organizational structure and systems behind them. If 19th-century statisticians *themselves* considered the organizational infrastructure used to generate social categories and collect social data to be an integral component of the statistical process, it seems reasonable to include organizational infrastructure and the human work used to generate numbers into their interpretation. Nineteenth-century statisticians believed that organizational structure was an important component of the statistical process because similar organizational structures and social categories ensured standardization *within* and *across* nation-states. The thinking behind this was effectively that apples should be compared with apples and oranges with oranges regardless of whether they were located in France, Britain or Prussia. Otherwise, comparison either intra- or inter-nationally was more or less meaningless and statistical data useless (Prévost and Beaud, 2012; Thornvaldsen, 2017). Apples compared with tassels and the kitchen sink. As Prévost and Beaud (2012) observe, “statistical harmonization was a prelude and a precondition of a more ambitious political harmonization among nations” (61).

THE PROLIFERATION OF THE NATIONAL CENSUS

What were 19th century statisticians in these new statistical institutes discussing? The late 18th and 19th centuries mark the period when the regularly administered national census was adopted by many nation-states in both Europe and the Americas (Labbé, 2019; Desrosières, 2002; Hacking, 2013; Prévost and Beaud, 2012). These censuses continued many of the historical population counting practices surveyed in the previous chapter. However, they are distinct to the extent that they attempted to quantify more humans (not all) - and more social and behavioural characteristics of these humans – who were spread over a significantly larger geographic area with significantly greater regularity by a centralized national bureau dedicated to their collection.

In Thorvaldsen's (2017) view, Quetelet's approach is synonymous with modern census-making which he differentiates from previous population enumerations using the following three major criteria which I also use in this dissertation: 1) "commissioned by a national legal authority"; 2) "complete coverage of a national territory"; and 3) "performed at regular intervals (2017, 2). Although there is not a consensus on this view, Thorvaldsen (2017) posits a clear historical division between census-taking pre-and post-Quetelet. Namely, he suggests that Quetelet refined population counts to such an extent that his ideas and methods should be used to define the modern census.

Many enumerations taken before Quetelet cannot meet the strict demand of the definition above and we call them pre-censuses or census-like materials. Most censuses taken with his Belgian 1829 census as the source of reference meet the requirements of the definition. Thus, we can use his census recommendations as a measuring stick for census quality in different periods and places (Thorvaldsen, 2017, 3).

Why were counts commissioned and by whom?

The emergence of the national census is largely a 19th-century phenomena, with some exceptions. There is some debate over when and who conducted the first census. Within Europe, Britain is sometimes described as conducting the first European national census in 1801 (Christopher, 2008, 271; Levitan, 2011). However, the Swedish Empire conducted a comprehensive and regular census of all the inhabitants of its geographic territory significantly before this, from 1749 onwards. Both Spain and France attempted censuses in the late 18th and early 19th centuries (Wisselgren, Edvinsson, Berggren & Larsson, 2014, 139; Edvinsson, 2015; Instituto Nacional de Estadística, 2023; Biraben, 1963).

National censuses of newly formed nation-states in formerly colonies also began during this period, particularly in the Americas, where a variety of national independence movements were taking place (Gobierno de Bolivia, 2021). With the important caveat that many pre-colonial population counting systems existed that had been subsumed by colonial administrations, the first national censuses of newly independent nation-states occurred during the 19th century. For example, the United States famously enshrined the census in its Constitution and conducted its first census shortly after independence in 1790. Bolivia, which gained its independence from Spain in 1809, conducted its first census in 1831 (Gobierno de Bolivia, 2021). Similarly, Peru –

which gained independence from Spain in 1821 - conducted its first national census in 1836 (*Instituto nacional de estadística e informática*, 2023).

Table 4: 18th and 19th century national censuses

Country	Year
Japan	1721
Sweden*	1749
Spain*	1768
United States of America	1790
France*	1791
Mexico	1793*
England*	1801
Peru	1821
Bolivia	1831
Belgium*	1846
Austro-Hungarian Empire	1869
India**	1871
Canada**	1871
Brazil	1873
Mexico	1895
German Empire**	1895
Mexico	1895
Russian Empire	1897

*Colonial power

**Census initiated by colonial power

Additionally, colonial censuses continued to follow the project of colonization and empire, which was obviously ongoing during the 19th and 20th centuries and focused increasingly on sites in Asia and Africa as colonial powers turned their attentions to these regions after the loss of the Americas. For example, the census of India - believed to account for over half of the people in the British colonial empire - began in 1871 following the precedent set in 1821 by the British Colonial Office which mandated counts of the British colonies be collected in the *Blue Book* series – a series dedicated exclusively to colonial statistics (Christopher, 2008, 271; Levitan, 2011).

There were many reasons for the institutionalization of the census over the course of the 19th century. Certainly, the centralization of the national state and the desire for social control through surveillance or the inventorying of the national population have been noted by a number of writers on this topic (Scott, 1998; Osborne and Rose, 1997). However, Levitan (2011) – a historian who writes on the 19th century British census debates - also suggests that censuses during

this period functioned both as a surveillance tool and also as a means to contest the tyranny of government by allowing individuals to assert collective identities in the negotiation for their rights (6) - a tool that “all educated people ought to study in order to find out more about themselves and their country” (5).

The structure and information sought by the 19th century national census was heavily influenced by Quetelet’s 1829 census of the region of Brabant which was used as a template both for the 1846 national census of Belgium and later many (although not all) European and North American national censuses (Thornvaldsen, 2017, 3, 66; Prevost and Beaud, 2012). As Thornvaldsen (2017), author of a global history of the modern census, states clearly:

The pivotal person in the history of the population census is the Belgian multi-disciplinary scientist Adolphe Quetelet with his taking of censuses in Brussels and the Low Countries from 1829 onwards... He certainly did not invent the censuses – several full-fledged censuses were taken earlier, for instance in Denmark. However, Quetelet made the census into a comprehensive international undertaking through his work to spread a more standardized enumeration methodology at statistical conferences, which he presided over from the 1850s onwards (3).

Over the course of Quetelet’s initial few statistical congresses between 1853 and 1876, he promoted a standardized census form based on the Belgian model to most European nations (Thornvaldsen, 2017). As an indicator of the type of social information sought by the census, the 1846 census was organized by household units and included the following social categories:

- Inhabitants by province and commune type (including nomadic peoples)
- Gender (woman, man)
- Marital status (single, married or widowed)
- Origins (from the commune or the same province, from another province from the same country or foreigner)
- Country of origin of foreigners (including Limbourg, Luxembourg, Holland, France, Germany, England and Other country)
- Language (French or Walloon, Flemish or Dutch, German, English, Other language)
- Religion⁴⁷ (Protestant/Anglican, Jewish, Not declared)
- Total number of children under age six by birth year (including live births and deceased after birth children)
- Age of the population⁴⁸ (only from 19 to 29 including surviving militiamen)
- Full population age breakdown by age and province (including the age categories 0-5, 5-15, 15-80, 80+)
- Centenarians by province⁴⁹

⁴⁷ Interestingly, Catholics are not included in the count.

⁴⁸ These are presumably male population members who could bear arms.

⁴⁹ There were less than twenty in both years surveyed.

- Professions divided into profession type (divided into manual professions and liberal professions with more detailed breakdowns) and work hierarchy status (master or worker)

Similar to the metric system, Quetelet used his statistical congresses from 1853 on to promote his census model to the statistical community. As my analysis in Chapter 6 shows, the internationalization of the national census was a major priority for the IIS but it was not an easy task to accomplish. While it may seem straightforward, the problem was that the list category that existed in one nation-state (ex: see the ‘Country of origin of foreigners’ or ‘Religion’ categories below) did not necessarily exist in another. The question of *how* the census could be reliably standardized internationally occupied much of the ISI’s discussion time as I show later.

Who did the work and how did they do it?

The people who did the work of ‘the science of government’ were a mixture of government statisticians, academic statisticians and bureaucrats (Prévost and Beaud, 2012). As Thornvaldsen (2017) notes, these people would have increasingly seen themselves as ‘enlightened’ scientists doing the scientific work of elucidating natural social laws that governance should be based on as opposed to mere government employees filling out forms. The characterization of statistical workers as enlightened scientists is very different from the way that other counters had been described in the European context, like, the “sober and Ancient women” of the plague counts (Forbes, 1974, 1032). It suggests a significant increase in the esteem attributed to the work of enumeration closer to the colonial model discussed in Chapter 3, where the work was seen not just as an occupation in of itself but also a prestigious occupation requiring knowledge and training. Official census-taking work would have been a very labour-intensive task because the majority of people being surveyed would have been illiterate, meaning that census respondents would have been unable to read and fill out the census form. Instead, census-takers would have had to observe or orally administer the questionnaires to gather information from respondents. The census-takers would have made all kinds of decisions about discretionary items such as spelling, age (particularly if they thought the person was lying), language (particularly if the census-taker did not speak the respondents’ language very well) and so on.

Due to the very independent and discretionary nature of the work, the *moral character* and *wage* of the census takers themselves was taken into Quetelet's methodological considerations of the 1846 Belgian census. Specifically, he states:

One of the first difficulties to resolve is how the census agents should be compensated; because to have intelligent census takers, they must be suitably compensated [for their labour]. In order to prevent the difficulties that ignorance, indifference or ill will could bring about, the census agent should, everywhere where he⁵⁰ presents himself but especially in the rural communes, not limit himself to distributing and collecting the three census bulletins; he should, moreover, be capable of eliciting the declarations of the inhabitants who are not capable of doing it themselves⁵¹.

I present a more detailed discussion of how the debate on hiring census workers in my analysis of statistical bureaucracy in Chapter 6.

Summary

This chapter continued my analysis of historical European list-making practices, this time in the 19th century. I first argued, following Thornwaldsen⁵² (2017), that the late 18th and 19th centuries involved a period of rapid institutional refinement and technical standardization that allowed population counts to be conducted across larger geographic areas with more frequency and relative rigor than previous population counts, and marked the institutional adoption of the 'modern' census. This approach was hegemonic, replicating Quetelet's work in Belgium, and standardized the early census format across nation-states.

Second, I provide historical support for Desrosières' (2008a;2008b) observation that sociological understandings of statistics are necessary because they demonstrate the various ways that organizational structure, the social character of workers, and worker compensation related to the practice of statistics and were active concerns of early statisticians. As mentioned in Chapter

⁵⁰ This is gendered language that likely accurately reflects the exclusively male workforce.

⁵¹ « Une des premières difficultés à résoudre était de savoir comment les agents de recensement seraient indemnisés; car, pour en avoir d'intelligents, il fallait les rétribuer d'une manière convenable. Afin de prévenir les difficultés auxquelles donneraient lieu l'ignorance, l'indifférence ou la mauvaise volonté, il fallait que l'agent de recensement, partout où il se présenterait, surtout dans les communes rurales, ne se bornât pas à distribuer et à retirer les trois bulletins du recensement; il devait, en outre, être en état de les rédiger d'après les déclarations des habitants qui n'auraient pas été à même de le faire » (Quetelet, 1846, XIII-XIV).

⁵² Thornwaldsen (2017) argues that "the 18th and first half of the 19th century were a transitional phase in census taking" (7).

2, following thinkers like Anderson (2006), Hobsbawm (1979) and Desrosières (2008a;2008b), I characterize statistics and the census – one of the most important components of 19th century statistics - as an underexamined elements of 19th century nation-building.

I did this in three ways. First, I examined changes in the scientific and political *weltanschauung*, specifically the introduction of the metric system of measurement and changes to the structure of the academic system favoring mathematics and the empirical sciences to thinking on natural and social measurement. I argued that these changes led to a tendency towards more standardized, empirical, scientific and quantitative assessments of both the physical and social world that influenced the 19th century statistical project. Second, echoing and extending Anderson's (2006) analysis, I analyzed of the initial discussions surrounding the *establishment of a network of European statistical bureaus and the national census* during the 19th century. I noted that the secondary literature suggests that statistical bureaus were often modelled on Quetelet's centralized Belgian Central Commission model that he actively promoted to his colleagues – a theme that I will develop more in subsequent chapters. Further, I provided an inexhaustive table indicating when national censuses were introduced. I also indicated the information sought by these initial censuses by examining the 1846 Belgian census, Quetelet's census that served as a template for other nations, providing me with valuable material for the empirical examination of the annals of the IIS that I conduct in Chapter 6. Ultimately, I concluded that the *weltanschauung* surrounding Pierre-Simon de Laplace, Adolphe Quetelet and the early members of the IIS was one that promoted the standardization of measurement systems using approaches that could be said to be derived from Nature, the promotion of quantitative approaches to knowledge-making and national statistical institution-building projects based heavily on Quetelet's ideas.

CHAPTER 5: QUANTITATIVE EPISTEMOLOGY, JUSTIFYING SOCIAL GRAVITY

As Desrosières (2002; 2008a;2008b) argues, social quantification is a two-part process based around: 1) the establishment of categorical and list-making techniques, and 2) the establishment of conventions of equivalence between mathematical techniques and these lists. The first stage of this process involves the work of constructing discrete, standardized variables that exist along a spectrum of attributes. In the case of quantitative social research, these variables take the form of social categories and are filled out in extensive population lists. The previous two chapters explored the first stage of the social quantification process by examining the intended purpose, institutions, workers and protocols used to generate some prominent European lists of the population. Chapter 3 explored some list-making practices generated during the 16th to 18th centuries and Chapter 4 elaborated on how 19th century lists both extended and altered these historical practices.

The second part of Desrosières' (2002; 2008a; 2008b) process of social quantification involves the establishment of conventions of equivalence between mathematical techniques used to generate metrics summarizing trends in the data, and the content that they are supposed to represent. This process involves the epistemological justification *for the application of mathematical techniques to social phenomena* (i.e. Why can we even use these techniques at all?) as well as *the creation of standardized interpretations of those metrics* that would be used by a community of experts in their analysis. In the case of social statistics, these interpretations answer questions like: what does the single numerical outcome (ex: 5) of some quantitative manipulation *mean in relation to the social body*? What does it reveal to us about what is '*really happening*' in the aggregate social body and why?

Purpose and argument of this chapter

This chapter is connected to the first conceptual argument⁵³ of this dissertation because I examine some of the primary historical texts (identified in the secondary literature on statistics) that were

⁵³ As a reminder, my **first major argument** relates to the technical processes used to establish 19th-century nationalism. I suggest that statistics should be better included and theorized as a technology of nation-building- similar

used to justify the application of mathematical techniques from the natural sciences to the social sphere and ‘naturalize’ the nation as a unit of social organization and development imposed by natural law. The **purpose** of this chapter is to begin my empirical analysis of the primary texts that were used to justify the application of mathematical techniques to the interpretation of population lists, by extension, the nation-state and social world. Both of the thinkers whose work I analyze in this chapter, Pierre Simon de Laplace and Adolphe Quetelet, were writing during a time when the application of any type of mathematical concept beyond simple arithmetic to population counts had not been done and was not accepted. Again, although it may now seem natural to apply mathematical techniques to the interpretation of human social lists and to use quantitative metrics to summarize the data, their use was not widely accepted during the period investigated in this dissertation and choices had to be made about which techniques would be used to understand human national populations and what their interpretations would be. The suggestion that mathematical techniques *could* be applied to human population counts was itself novel. The novelty of this suggestion meant that extensive justification, debate, deliberation, argument and contingency was required to convince groups of academics and administrators that statistical techniques and their interpretations were *the* acceptable *and* scientific way to understand human populations. These debates formed part of an emerging scientific culture which was also political and social and inherently linked to the development of institutions.

I make **two related arguments** in this chapter. My **first argument**, following Desrosières (1998) and Porter (1995;1986), is that Adolphe Quetelet’s epistemological arguments for the application of more advanced quantitative methods to the study of human populations were a direct expansion of Pierre-Simon de Laplace’s ideas. This is important because they show the assumptions that were made about scientific progress and analogies between subject matters that were used to justify the application of techniques that, up until that point, had only been used in astronomy to the study of human national populations. In this chapter, I demonstrate that Laplace justifies the application of mathematical techniques to the study of human populations by claiming

to literacy and the standardization of national vernaculars - that furnished a very compelling *quantitative* administrative vernacular of 19th century nation-states that often boasted “*privileged access to ontological truth[s]*” (my italics, Anderson, 2006, 36). Following Desrosières (2008a), I argue that the practical work and institutional protocols that went into the collection of population lists, and their quantitative analysis should be analyzed and understood as a technique of 19th-century nationalism and nation building, a form of seemingly quantitative nation-building that promoted the nation as a natural unit of social organization and development. I also note that there is limited examination of statistics in the literature on methodological nationalism (Wimmer & Glick-Schiller, 2003).

that scientific advancement occurred through analogy. Using analogy, he then argues that the social world functioned in exactly the same way as the natural world, specifically, through gravity-like “constant causes” discernible only through mathematical analysis of multiple quantitative observations of the same phenomenon. Quetelet adopts and further refines Laplace’s arguments by claiming that these same gravity-like natural laws or constant causes drive the development of the social world, causing it to progress through increasingly sophisticated types of political organization, of which, the nation is penultimate form after humanity in its entirety. I extend Desrosières’ (1998) and Porter’s (1995;1986) arguments by explicitly connecting common themes and arguments in their major works together through my analysis.

My **second argument** is that methodological nationalism was built directly into the 19th century statistical project through the epistemological assumptions its early proponents made about the meaning of quantitative analysis of aggregate social data. Specifically, Quetelet’s application and expansion of Laplace’s probabilistic techniques to the study of social phenomena allowed for a new “realism of aggregates of things or people” (Desrosières, 2008, 68) in which the nation-state was quite literally seen as a form of social organization *invented by Nature herself* (Quetelet, 1835; 1845). An ideal type, whose ‘true’ existence was *literally only visible through the use of quantitative methods and probability theory*. I contribute to the literature by arguing that this perspective is reflective of Daston and Galison’s (2007) ‘truth-to-Nature’ idea of scientific objectivity that was common in early scientific practice. This approach privileged beauty and Otherworldly ideal types that *by definition* did not exist ‘in reality’ as the truest and most ‘objective’ depictions of Nature⁵⁴. I argue that Quetelet believed that the ‘aggregate’ perspective of the social world furnished by the mathematical interpretation of lists was justified by Enlightened science and put in place by Nature herself. In statistical techniques, he saw the potential both for new ways of conceptualizing the social world and developing effective political interventions to regulate it and ensure that it remained balanced, staying on the path set for it by Nature. In his mind, statistics was the only way to scientifically and objectively ‘see’ the nation.

⁵⁴ Daston and Galison’s (2007) seminal work describes the evolution of notions of scientific objectivity over time, evolving through three types: truth-to-Nature, mechanical objectivity and trained judgement. Truth-to-Nature describes the first phase of objectivity. Used by early naturalists like Linnaeus, it was based on representing nature through idealized depictions (from which individual phenomena were flawed derivatives). Beauty and balance were two key features of this idea of objectivity that have been abandoned in subsequent notions.

This chapter is structured in the following way. First, I provide a brief overview of probability theory to describe what it is and what Laplace contributed to the field. I then move to an analysis of primary texts that were used to epistemologically justify the application of probability theory to human population lists and develop social interpretations for them. First, I examine Pierre-Simon de Laplace's *Essai philosophique sur la probabilité* (1840), the major epistemological justification for the application of probability theory to the study of human social groups. I then examine how Adolphe Quetelet further refined and expanded Laplace's ideas by developing statistical protocol techniques, interpretations and a code of statistical 'ethics'. I do this by deriving major themes from the analysis of three major texts written by Adolphe Quetelet: *Théorie des probabilités appliqués aux sciences morales et politiques* (1846), *Du système sociale et les lois qui réagissent* (1846), and *Physique sociale ou Essai sur le développement des facultés de l'homme* (1869). I chose these texts because they relate directly to statistics and are commonly identified in the secondary historical literature as influential (Desrosieres 2008a;2008b; Porter, 1995).

Probability theory: an overview of key figures, developments and concepts before Laplace

I use this section to briefly develop some of the history of probability theory leading into Laplace based on the STS and history of mathematics literatures. Probability theory has a *different* historical trajectory from statistics (which had historically used arithmetic and, occasionally, multipliers to interpret population lists, if anything). It is recognized in many histories of statistics as the factor that transformed the practice of statistics from a descriptive, qualitative approach to a mathematical science (Gigerenzer et al.,1989; Porter, 1995; Hacking 1991). An understanding of probability theory is also important because it demonstrates the historical tensions between *individual discretion* in statistical reasoning (or the ability of a person using statistics to use their reason/intuition to make analytical choices) and *the automation of reasoning* through statistical techniques (a person assumes that the mathematics are infallible and accepts whatever the outcome of a manipulation is without questioning it). An understanding of this tension is important, first, because it relates to notions of scientific objectivity and, second, because it provides context for Quetelet's discussions around statistical ethics and the limits of statistical insights – both themes

that are discussed by the ISI. Finally, it also demonstrates the various ways that *social norms*, particularly legal ones regarding equality, influenced early mathematical thinking on probability – supporting once again, the idea that mathematics is a (powerful) human language and not a feature of Nature (Gigerenzer et al., 1991; Daston, 1988; Daston & Galison, 2007).

The term ‘probability’ boasts a long and varied history (Hacking, 1975/2006). Derived from the Latin *probabilis* (meaning commendable and admirable, justifiable or plausible, credible and demonstrable). Probability as the *mathematical prediction of the likelihood of future events* first developed as a means to understand and predict gambling outcomes in games involving dice, coin tosses and cards. Most cultures have some version of gambling; however, most histories of probability identify a specific year, 1654, and a specific gambling problem, the “Problem of Points”, with the emergence of probability theory. It was during this time that an exchange of letters took place between mathematical prodigy Louis Pascal (1623 – 1662) and the famous jurist (and amateur theorizer of other things), Pierre de Fermat (1601-1665) (Hacking, 1975/2006; Gigerenzer et al., 1991; Desrosières, 1998). In this exchange, Pascal solved a problem posed to him by the famous gambler, the Chevalier de Méré: if a game of chance with a set number of rounds is interrupted in the middle of the game and the spoils must be allocated according to an uneven score between players, how should these spoils be allocated (Gigerenzer et al., 1991; Hacking, 1975/2006)? Pascal solved this problem mathematically by suggesting that the scores should be divided by the (set) number of rounds each player had remaining, providing a mathematical prediction of future events. Although the Problem of Points uses mathematical language to pose and answer a specific question, Pascal’s solution did not derive exclusively from mathematical theory alone but, like many early problems in probability, was heavily influenced by 17th-century legal norms of fairness (Gigerenzer et al., 1991; Daston, 1988). This sense of proportionality is evident in Pascal’s insistence that the profits should not be shared equally but according to each player’s proximity to the win.

Pascal then extended probability theory to areas outside of gambling, most famously applying the logic of coin tossing to the existence of God in a problem known as “Pascal’s Wager.” In this wager, Pascal asks if there is no way to prove God exists, what are the incentives to believe? If the outcome of not believing is eternal damnation and the outcome of believing is eternal bliss, Pascal suggests that the logic of the coin toss can illuminate this decision:

Let us examine this point of view and declare: ‘Either God exists, or He does not’. To which view shall we incline. Reason cannot decide for us one way or the other: we are separated by an infinite gulf. At the extremity of this infinite distance a game is in progress, where either heads or tails may turn up. What will you wager? (Pascal, 1669/1932, 344)

The significance for this dissertation of Pascal’s wager is not in its historical solution - which is not currently accepted - but in its field of application and the way that the problem is constructed. Specifically, the application of probability theory beyond the sphere of gambling to moral questions is important context for understanding Laplace’s later discussion relating the natural to the social world (Hacking, 1975/2006). The construction of the problem is notable because of the way that it contrasts human reason with mathematical calculation. During this period, mathematics was mostly used in relation to some concrete problem, often astronomy. The discipline of ‘pure’ mathematics - or mathematics divorced from the study of specific subject matters - was not present. Mathematics was meant to be used in relation to some applied problem like the distance between a planet and its moons. Indeed, according to Daston (1988), the idea of pure math was rare throughout the 18th century:

In fact, 18th century mathematicians would have found the distinction between the formal apparatus of math and the subject matter it related to be an alien one. For them, mathematics, even pure mathematics, did not exist without a real interpretation. Mathematics differed from the other sciences of nature only in the simplicity of its subject matter and the consequent certainty of its results (Daston, 1988, 54-55).

At the time that Pascal wrote, a ‘*good man’s*’ *reason* (this term is intentionally gendered to reflect practice) was accepted as the ultimate test of knowledge, *not quantified calculations*. If, for whatever reason, a mathematical manipulation disagreed with a ‘good man’s reason’, then the man’s reason triumphed, and the math was presumed incorrect and modified accordingly (Daston, 1988). Pascal’s wager privileged mathematical calculation over man’s reasons, an orientation in line with the ambitions of 17th and 18th century probabilists who hoped that mathematics would eventually codify a ‘good man’s reason’ (Daston, 1988). This tension between the potential for the automation of reason presented by mathematics and human reason is a prominent theme in the history of probability and is present in Quetelet’s discussion of ‘statistical ethics’ which I will engage later in the chapter.

Jakob Bernoulli (1654 – 1705), another important figure in the history of probability, expanded the notion of mathematical probability and posed an important problem that Laplace

later solved. Whereas Pascal largely conceived of probability as an all-or-nothing phenomena, Bernoulli was the first to suggest that mathematical probability could be conceptualized along a continuous spectrum (similar to the way that we now conceive it) (Daston, 1988). This is evident in his definition of probability: “Probability is a *degree of certainty* and differs from it as a part from the whole” (quoted in Daston, 1988, 34). Like Pascal, Bernoulli’s definition of probability as “degrees of certainty” does not derive from any mathematical rationale but is, like the “Problem of Points”, again related to legal norms of the time, specifically norms regarding the ‘completeness’ of legal evidence. Although Bernoulli, like the legal theorists, ultimately codified his degrees of certainty using guesswork, the idea of probability as a continuum as opposed to an all-or-nothing phenomenon was an important development (Daston, 1988).

Bernoulli’s major contribution, referred to as *Bernoulli’s theorem* or the *law of large numbers*, is a theorem built around a ball drawing analogy, a classic analogy in probability theory given its roots in gambling. The problem is set up in the following way: if an urn is filled with black and white balls in some fixed proportion unknown to observer, how can the distribution be known (Chatterjee, 2003)? Bernoulli solves this problem by suggesting that even if the original distribution of black and white balls is unknown, we can use the long-term relative frequency of the ball samples as an estimate of the original distribution (Chatterjee, 2003). From this, Bernoulli made the assumption that if the observer were to draw balls an infinite number of times, the observed frequency of the balls would be equal to the actual proportion in the urn (Gigerenzer et al., 1991).

Although this observation may seem banal, it was quite significant in the history of probability because it reorients *how* the question of the ball distribution could be resolved. Namely, instead of asking *why* the balls are distributed a particular way and looking for a *causal* force that instigates this distribution, Bernoulli’s theorem allows us to ignore this question and focus our inquiries on the number of draws needed to ascertain the original ball distribution with some degree of precision. Gigerenzer et al. (1992), who have written extensively on the history of statistics, argue that Bernoulli’s theorem was a ‘causal model without causes’ in the sense that it allowed for the prediction of an outcome without commenting on *why* that outcome had been achieved. They claim that Bernoulli had created

a new model [that] abandoned all search for mechanisms, for the hidden springs and the principals that ran the clockwork of the world. In Bernoulli’s urn model, numbers

generated numbers; the physical processes by which they did so were wholly inscrutable (30).

Bernoulli's theorem, however, proved extremely cumbersome in practice, requiring thousands of trials in order to predict the actual distribution with a strong probability (Gigerenzer et al., 1991). It could determine the number of trials necessary to determine the original distribution given a certain level of probability, but it could not determine the probability of a given frequency given x number of cases (Gigerenzer et al., 1991).

It was both Pierre Simon de Laplace (1749-1827) and Thomas Bayes (1702-1761) who inverted and solved Bernoulli's theorem independently of one each other, developing what is now called the 'central limit theorem' – a theorem that is absolutely fundamental to the practice of statistics today (Gigerenzer et al., 1991). Laplace, most interestingly, not only inverted the problem by solving for the probability of a given occurrence, but also introduced a novel assumption regarding the relation of independent cases. Laplace developed the central limit theorem while contemplating two separate problems: 1) the incline of the planets and 2) a more general question concerning whether the mean error of any given set of observations had limits (Adams, 1974). Laplace was influenced by the work of his contemporary, the mathematician and astronomer Carl Friedrich Gauss (1777-1855), who had previously developed a theory of errors of observation that had successfully charted the orbit of an unknown planet based on limited observations (Adams, 1974; Desrosières, 1998). In this theory, Gauss suggested that "the arithmetic mean of several equally trustworthy direct observations of a single quantity is the 'best' estimate of the unknown quantity" (Adams, 1974). When plotted, Gauss's law of error produced what we would now call a normal distribution. Laplace applied Gauss's law of error to Bernoulli's inverted problem.

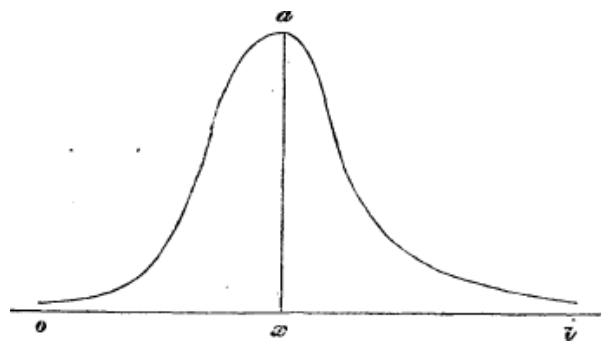


Figure 9: Gauss's error curve

From this, Laplace generated the central limit theorem which posits that given an infinite number of repetitions, the distribution of a given set of samples will approach a Gaussian (later renamed ‘normal’) distribution (Lyon, 2013). The significance of this insight cannot be understated. The central limit is a core component of all introductory texts on statistics. Isaac Todhunter, a mathematician and historian who wrote an extensive and well-regarded internalist history of probability (intended for only a mathematical audience), states that “on the whole the Theory of Probability is more indebted to [Laplace] than to any other mathematician” (1949, 464). It was Laplace who came up with the most detailed epistemological argument for the importation of probability from the fields of astronomy and gambling to the social sphere. It was also Laplace who applied his ideas of probability to the social sphere paving the way for Quetelet who adapted his ideas and influenced the organizational mandate of the ISI.

Pierre-Simon de Laplace and his probabilistic theory of the social sciences

Pierre-Simon de Laplace is a very prominent figure in the histories of probability, science and revolutionary France. The development of the social context of the historical figures associated with scientific developments is a perennial (and disputed) theme in the STS literature. This is because the STS literature complicates the subject-object dynamic typical of traditional thinking about scientific inquiry where science and the scientific thinker (often the solitary, singular genius) are often characterized as mirroring nature. Instead, STS orientations⁵⁵ complicate the strict

⁵⁵ This is not to suggest that STS orientations all theorize the role of the social in the same way. Characterizations of how the social sphere influences the practice and content of science as well as what exactly constitutes the social can differ widely. As an example, the Strong Program, founded by David Bloor and Barry Barnes, (sometimes called the Edinburgh School) argued that the STS framework should be used to explain the “very content and nature of scientific knowledge”, encouraging sociologists to actively embrace the inherent relativism of knowledge (1982, 3). As opposed to the Strong Program, which sought to include modern science within the anthropological gaze and assumed that its projection would yield the same results as it had with the analysis of what were then characterized as ‘non-modern’ cultures, Bruno Latour’s *oeuvre* suggests that the anthropological analysis of modern scientific practices instead exposes what he understands to be the central paradox of modern knowledge production. This central paradox is based on the two contradictory sets of practices performed by modern knowledge: “*The first set of practices, by ‘translation’ creates mixtures between entirely new types of beings, hybrids of nature and culture. The second, by purification creates two entirely distinct ontological zones that of human beings on the one hand; that of nonhumans on the other. Without the first set, the practices of purification would be fruitless or pointless. Without the second, the work of translation would be slowed down, limited or even ruled out. The first set corresponds to what I have called networks; the second to what I shall call the modern critical stance*” (11). The creation of objects that are both social and natural at once coupled with the belief that two separate ontological zones exist is the central tension of modernity what Latour calls “the modern Constitution” (p.29).

subject-object relation posited by Cartesian approaches (i.e. the social sphere has no influence at all on the content of science). Seen through this lens, science is ~~in some way~~ always is/or/is also a *social phenomenon*, related to the forms of local culture (i.e.: the scientific lab) that produce it and the systems that generalize its findings (i.e. an event determined by the lab is deemed to be universally applicable and/or present (Golinski, 1998). Although debate certainly exists regarding how people doing science should be characterized, the STS framework broadly suggests that “human subjects should not be regarded as detached minds passively contemplating the immaterial world; they learn about it through embodied iteration” (Golinski, 6, 1998). An elaboration of the social context and biographies of scientific thinkers and communities is therefore important for understanding their scientific ideas.

Brief biography of Laplace

In this section, I provide a brief biographical sketch of Laplace and then elaborate on the results of my analysis of his major essay on the social world, *Essai philosophique sur les probabilités* (1814). Together with Joseph-Louis Lagrange (1736-1813), Laplace was considered the most senior academic in the most lauded disciplinary field of the most prestigious institute in France at a time when the French academic system was being completely reorganized to privilege empirical and mathematical approaches. Laplace’s expertise in science and mathematics was considered practically infallible during his lifetime (Hahn, 2005). Born in 1749 to affluent farmers in Normandy, Laplace became one of the leading scientists of both the *Ancien Régime* and Revolutionary governments. Although he died in 1827, his ideas and, most relevantly for this chapter, his comprehensive probabilistic theory of the social world, are reported to have remained heavily influential in French intellectual and political circles until the late 1880s.

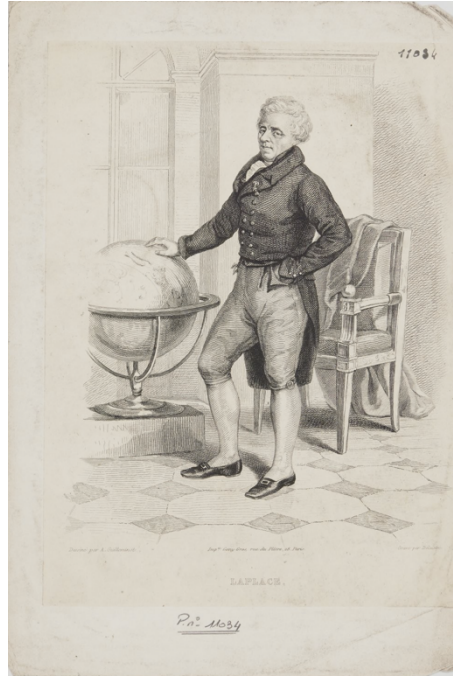


Figure 10: Pierre Simon de Laplace (A. Guilleminot engraved Delaistre)

Over the course of his life, Laplace held influential positions in the academic system and French politics. He first rose to prominence in the Academic system as French Encyclopedist and polymath, Jean le Rond d'Alembert's (1717-1783), protégé and was recognized as one of the leading figures of the French Academy from 1780 onwards (Gillespie, 1997, 23). During the *Ancien Régime*, he worked with various political commissions to incorporate scientific ideas into their political administration. In 1786, Laplace was, for example, involved in a commission to determine the multiplier needed to establish population estimates of the entire French kingdom (a novel measurement) based on regional counts (Gillespie, 1997). From 1791 onwards, Laplace played an integral role in the panel of scholars who formed the Commission to study and implement the universal system of weights and measurements which Laplace, himself, in fact, named the metric system (Gillespie, 1997).

After the Revolution, Laplace's political involvement with the Revolutionary government was heavily tied to his personal relationship with Napoleon Bonaparte (1769-1821) (Gillespie, 1997). Laplace, who was twenty years Napoleon's senior, first encountered Napoleon as his professor. Laplace evaluated Napoleon's mathematical skills when Napoleon was just a young artillery cadet, earning Napoleon's admiration and beginning a friendship that presumably ended shortly before Laplace – a Senator placed in the Senate by Napoleon - voted to overthrow Napoleon and reinstate the Bourbon monarchy (Gillespie, 1997; Hahn, 2006). Napoleon was hugely

impressed by Enlightenment science and actively sought to reorganize both the academic and political systems to privilege the authority of Enlightened science and mathematics over other forms of knowing because they were believed to be derived from nature. This was important because it was believed that systems derived from nature were immune from the (potentially) corrupting influences of the social world. As a result, they were believed to be more in line with French republican values because they were perceived to be more truthful and meritocratic. Indeed, it was not until after 1789 and, particularly after Napoleon's 1799 coup, that probabilistic approaches to social statistics became a viable and academically acceptable way to understand the social world (Heilbron, 2006). Desrosières (2008a) emphasizes this when he argues that:

[l]e changement de sens du mot 'statistique' apparaît clairement en France vers 1806, quand Napoléon prend conscience de ce que la statistique que lui fournissent les préfets est inutilisable pour ses projets de gestion unifiée de l'Empire dans le cadre de l'économie de guerre et du blocus continental. Il commande alors des recensements et des grandes enquêtes agricoles et industrielles, fournissant des chiffres de production de blé, de charbon, de fer, etc.⁵⁶ (148).

The new political system and approach to rule imposed by Napoleon (and the French Revolution generally) demanded more knowledge about the new national population that they hoped to govern inviting new empirical and mathematical methods into the practice of governance.

When he first assumed power, Napoleon appointed Laplace to be Minister of Interior - one of the most important posts in the Republican domestic administration (Gillespie, 1997). Unfortunately, Laplace proved to be an incompetent administrator and was quickly removed from the post and demoted to more "ornamental" but no less prestigious political positions including the position of Senator and Chancellor of the Senate (1803), the Legion of Honour award (1805) and the Order of La Réunion award (1813) (Gillespie, 1997). In a historical sociology of quantification framework, Laplace's social origins and relation to political regimes in France – particularly his close but volatile relationship with Napoleon - are important factors that give us insight into why he, as opposed to other thinkers, was chosen to justify the quantification of the social world after having spent a lifetime dedicated to the academic study of the planets and stars.

⁵⁶ Translation: The change in meaning of the word, 'statistics', appears clearly in France around 1806, when Napoleon noticed that the statistics that the prefects were providing him were unusable for his project of unifying and managing the Empire within the framework of a war economy and the continental blockade. He ordered censuses and large agricultural and industrial inquiries, providing numbers on wheat production, carbon, iron, etc.

His academic and political trajectory also gives us insight into why his framework was used as the basis for Adolphe Quetelet's quantitative social science.

Essai philosophique sur les probabilités

Laplace's main academic works deal almost exclusively with astronomy or mathematics. They include: the five volume *Traité de mécanique céleste* (1798-1825) (published over the course of his lifetime), *Théorie Analytique des Probabilités* (1812), *Essai philosophique sur les probabilités* (1814) and *Exposition du système du monde* (1824). He wrote both technical summaries intended for non-expert scientific audiences as well as popular language summaries meant for the educated public. The *Essai philosophique sur les probabilités* (1814) is Laplace's only work dealing with the social world and came shortly after the publication of Laplace's major mathematical work on probability, the *Théorie Analytique des Probabilités* (1812). Whereas the *Théorie* is a true mathematical treatise on probability, intended for a mathematical audience with some minor applications to social phenomena, the *Essai* is an epistemological work intended not for mathematicians or astronomers but a more general academic audience. For the purposes of this dissertation, the *Essai* is Laplace's most interesting because it heavily influenced Quetelet's thinking about social statistics. This section reports the results of my analysis of his work in conjunction with the secondary literature on its reception and influence.

The secondary literature discusses several motivations for the *Essai*. First, Laplace was lauded for his work on mathematical probability and particularly for his application of probability to the physical world (Hahn, 2006). In order to cement his position as the authority on probability and fulfil his institutional mandate of extending the application of math to new areas, Laplace needed to extend his discussion of probability to the newly minted social sciences to further extend his academic prestige (Hahn, 2006). Second, probability theory – or “good sense reduced to math” - exploited the post-Revolutionary bourgeois ideal of meritocracy, particularly for Napoleon's political administration, building on the Enlightenment ambition to build social systems based on ‘natural laws.’ The desire to extend the probabilists' project by automating ‘good’ reason (via the use of mathematics) to understand and intervene in human politics was a prominent impetus for the development of a new practice of statistics informed by probability theory by both Laplace and Quetelet. Probability theory was, therefore, seen as an essential tool of modernity and advancement

(Schneider, 1987). Third, through the *Institut*, Laplace was increasingly in touch with the *idéologue* movement whose goal was to found a science capable of understanding the human world (Hahn, 2005; Gillespie, 1997). Fourth, Laplace was in the company of many atheists who also rejected traditional understandings of causality that put God as the center of everything and was heavily influenced by Newton's discovery of gravity which he believed was the model for all phenomena in nature (Hahn, 2005).

As a result, Laplace justified the application of probability theory to social phenomena as the logical culmination of a scientific progression beginning with “la magie et l’astrologie” and ending in the rigorous, impartial and Enlightened science of the French Republic. Hahn (2005) reports that previous to this work, Laplace’s philosophical ideas on society and human behaviour made up only two pages of his voluminous mathematical and astronomical work. The work itself abounds with an almost unimaginable hubris. In order to apply probability to social phenomena, the essay is based on the unproven and *a priori* assumption motivated by Newton’s law of gravity that great gravity-esque laws drive all natural and social phenomena:

*Ainsi on peut dire que la nature elle-même a concouru à la perfection analytique des théories fondées sur le principe de la pesanteur universelle; et c’est, à mon sens, une des plus fortes preuves de la vérité de ce principe admirable*⁵⁷ (Laplace, 1814, 111).

Laplace goes so far as to say that “*le système entier des connaissances humaines se rattache à la théorie [de la probabilité] exposée dans cet Essai*”⁵⁸ (Laplace, 1814, 2). This characteristic and his steadfast belief in the existence of gravity-like social laws that could only be inferred through probability theory is often emphasized by STS scholars who have studied his work. Gigerenzer et al. (1989), for example, note that “Laplace was ... nonchalant in making the same assumption that ignorance could be converted into a uniform distribution of prior probabilities, offering no justification whatsoever” (32). Similarly, Hahn (2005) describes Laplace’s “remarkable faith in the existence of constant laws in nature” (175).

Laplace’s argument in the *Théorie* is based on three central claims: 1) gravity, a great law of nature, was discovered by using probability theory and multiple observations of the same phenomena in Nature; 2) scientific discoveries are made through the use of analogy; 3) ergo the

⁵⁷ Translation: We can also say that nature herself has shaped to analytic perfection the theories founded on the principle of universal gravity; and this is, in my opinion, the strongest proof for this admirable principle.

⁵⁸ Translation: The entire system of human knowledge is connected to the theory [of probability] developed in this Essay.

same method should be applied to all *human* sciences in order to determine their underlying causes enabling us to predict the future. Below, I will flesh out these three claims in more detail.

First, Laplace was convinced that Newton was able to discover gravity because of the use of probability theory (Stigler, 1987, 289; Hahn, 2005, 177). He believed that all phenomena were directed by ‘*causes régulières*’ or ‘constant causes’ of natural and social phenomena. Because all phenomena are driven by great laws, he assumes that probability theory can elucidate all regularities in nature in order to reveal the underlying causal laws that determine everything: “*Tous les événements, ceux mêmes qui par leur petitesse, semblent ne pas tenir aux grandes lois de la nature, en sont une suite aussi nécessaire que les révolutions du Soleil*⁵⁹” (1814, 2).

Second, these laws are only visible when multiple observations of the same phenomena are aggregated together – an observation that heavily influenced Quetelet. In Laplace’s view, each individual occurrence of a phenomenon is susceptible to “*cause irrégulière*” or irregular causes (p.73) which distorts the constant cause much in the same way that an individual measurement is prone to error. Laplace believed the probabilistic analysis of many observations was capable of eliminating the effects of irregular causes in order to reveal the true causes and effects of all phenomena, regardless of their scale, in nature.

Laplace’s extension of probabilistic techniques to social phenomenon was quite novel and required justification and explanation because it was not a way to understand human behaviour that was accepted by his academic peers. He relied purely on analogy to justify the application of probabilistic techniques to social phenomena based on the assumption that all scientific discoveries were based on analogy. As a result, *if* the natural sciences work this way, *then* the social sciences *must* as well.

Un grand nombre de découvertes dans les sciences sont dues à l’analogie.... La méthode la plus sûre qui puisse nous guider dans la recherche de la vérité, consiste à s’élever, par induction, des phénomènes aux lois et des lois aux forces. Les lois sont les rapports qui lient entre eux les phénomènes particuliers: quand elles ont fait connaître le principe général des forces dont elles dérivent, on le vérifie soit par des expériences directes, lorsque cela est possible, soit en examinant s’il satisfait aux phénomènes connus; et si par une rigoureuse analyse on les voit tous découler de ce principe jusque dans leurs moindres détails; si d’ailleurs il sont très variés et très nombreux, la science alors acquiert la plus haut degré de certitude et de perfection qu’elle puisse atteindre. Telle est devenue

⁵⁹ Translation: All events, even the smallest that do not seem to adhere to the great laws of Nature, are a consequence as necessary as the revolutions of the Sun.

*l'Astronomie par la découverte de la pesanteur universelle*⁶⁰. (my bold, Laplace, 1814, 256-257)

Laplace was so confident in the potential of inductive, probabilistic techniques to reveal the truth of nature that he famously argued that the natural and moral sciences would literally outfit the competent user with a god-like ability to accurately predict the future – a completely deterministic world view. Using the metaphor of what was translated into English as the “omniscient demon,” but which appears in the original French simply as the more benign “*intelligence*”, Laplace suggests, in the most quoted passage from this work, that:

*Nous devons donc envisager l'état présent de l'univers, comme l'effet de son état antérieur et comme la cause de celui qui va suivre. Une intelligence qui, pour un instant donné, connaîtrait toutes les forces dont la nature est animée, et la situation respective des êtres qui la composent, si d'ailleurs elle était assez vaste pour soumettre ces données à l'analyse, embrasserait dans le même formule les mouvements des plus grands corps de l'univers et ceux du plus léger atome: rien ne serait incertain pour elle, **et l'avenir comme le passé, serait présent à ses yeux***⁶¹(my bold, Laplace, 1814, 4).

Despite the promise of an omniscient demon or intelligence who could predict the future of all things in the universe based on the events of the past, Laplace's essay is entirely theoretical. His reflections on the social world are limited to drawing very general and unjustified parallels with the natural world. He gives no practical instructions for the institutionalization of the techniques and theories that he develops.

⁶⁰ Translation: Many discoveries in the sciences are due to analogy...The most reliable method that can guide us in our search for truth, consists of elevating, by induction, phenomena to laws and laws to forces. Laws are relationships that link particular phenomena; when they have made known general principle of the forces from which they derive, we verify it either by direct experiments, when possible, or by examining whether it satisfies the known phenomenon; and if by a rigorous analysis we see they flow from this principle down to the smallest detail; if, moreover, they are quite varied at numerous, science acquires the highest degree of certainty and perfection that it can achieve. This is how Astronomy came into being through the discovery of universal gravity.

⁶¹ Translation: We must therefore envisage the present of the universe as the effect of its previous states and as the cause of that which will follow. An intelligence who, in a given moment, knows all the forces from which nature is animated, and the respective situation of beings which compose it, if moreover it were vast enough to submit these data to analysis, would embrace the same formula of movements of the largest bodies in the universe and those of the smaller atom: nothing would be uncertain for her, and the future like the past would be present in her eyes.

Adolphe Quetelet: *Physique sociale, l'homme moyen* and the institutionalization of applied statistics

Laplace's ideas about the use of probability theory to understand the social world were popularized, expanded and institutionalized by another figure, Adolphe Quetelet (1796-1874). From a bourgeois family in Belgium, Quetelet was both Astronomer Royale of Belgium and a mathematician who is credited with founding the field of applied probabilistic statistics as a social scientific discipline and political tool that could be used to govern fairly and according to Nature's will (see Stigler, 1999; Porter, 1986). He founded several, major statistical organizations that continue to exist to this day, including the International Statistical Congresses (now ISI), the London Statistical Society (now the Royal Statistical Society) and the Belgian Statistical Society. He also established the academic journals associated with these societies including the *Journal of the Royal Statistical Society* and the *Bulletin de l'Institut international de statistique* – the journals that form the empirical basis for this study in Chapter 6 (Stigler, 1999).



Figure 11: Adolphe Quetelet

Quetelet was instrumental in popularizing Laplace's idea of the universality of the Gaussian error curve in nature - the technique that had been used by Laplace to 'solve' Bernoulli's theorem and generate the central limit theorem (Hacking, 1991, 132). In short, as the popularizer of statistics, Quetelet - through his various works - laid out a comprehensive and practical view of the scientific tools, interpretations and practices of Laplace's theory for political administrations so that they could understand their populations.

Quetelet's interpretation of Laplacean social science

*Si le grand architecte de l'univers n'avait parfaitement équilibré toutes choses, on conçoit quel chaos effroyable se produirait au milieu de ces myriades de mondes circulant dans l'espace d'une manière désordonnée et se heurtant les uns les autres. C'est par des lois semblables que sa divine sagesse a tout équilibré aussi dans le monde moral et intellectuel*⁶² (Quetelet, 300-301, 1848).

This section discusses my analytical conclusions from a reading of Quetelet's three most influential works. I focus on understanding: 1) how Quetelet interpreted and expanded Laplace's epistemological argument for the application of probability theory to the social sciences; 2) how Quetelet understood and justified the quantitative study of the nation within this framework; 3) the specific social interpretations of quantitative tools that he developed. It discusses the major themes distilled from this analysis and is thematically organized, moving from Quetelet's broadest ontological and epistemological claims regarding what Nature is and how it can be known, to his more procedural recommendations for the proper practice of statistics. His analysis is important because it expands on the conceptual framework that was used to apply novel quantitative manipulations to population lists using probability.

The first text, *Théorie des probabilités appliqués aux sciences morales et politiques* (1846), was written as a series of letters addressed to the King of Belgium (the words 'Votre Altesse' or Your Majesty are present on almost every page) and can be thought of as a kind of early grant application. It is structured as a series of short, plain language summaries explaining the central concepts of probability theory and elaborating on its social applications. The second text, *Du système sociale et les lois qui réagissent* (1846), includes the most detailed theoretical exposition of Quetelet's view of the social world, including reflections on the nation and nation-state, as well as his justification for why probability theory should be used to understand it. Finally, *Physique sociale ou Essai sur le développement des facultés de l'homme* (1869) is considered his *magnum opus* but is largely a rehashing of ideas from his previous works - he quotes extensively from his previous texts - and also provides a technical demonstration of how these ideas can be applied to different national issues and interpreted.

⁶² Translation: If the great architect of the universe hadn't perfectly equilibrated all things, imagine the horrific chaos that would occur in the midst of these myriad worlds circulating in space in a disorderly manner and colliding with each other. It is by similar laws that the divine wisdom has also balanced everything in the moral and intellectual world.

Like Laplace, all of Quetelet's ambitious texts are filled with an unbridled hubris. He strongly implies that he is the second (or now third after Laplace?) coming of Isaac Newton because of his 'discovery' of the gravity-like laws of the social world. But unlike Laplace, Quetelet is not remembered as a mathematician, scientist or astronomer of any particular note, if he is remembered at all. Porter (1986) observes that, "Quetelet almost never used math in his empirical work on statistics, and he developed no new evaluative tools that might have been put to use by others" (46). Quetelet's major ideas are largely derivative – the reason why Laplace's ideas had to be explored at length in the first section. His signature idea of *la physique sociale* or 'social physics' is thoroughly Laplacean⁶³. Quetelet accepts *ipso facto* the idea that all natural and human phenomena are driven by great underlying laws or Laplacian constant causes modelled after gravity (Schneider, 1987, 66). These constant causes are only visible if either many individual observations of the same phenomena are taken or if the information of many individuals who are all of the same type are aggregated together. This is because he believes that any one observation may be impacted by Laplacean irregular forces which Quetelet renames *forces perturbatrices*. The first step to identifying these constant causes is to use empirical methods to collect multiple observations of the same phenomena:

⁶³ This concept is currently associated with the term 'positivism', Auguste Comte's science. However, as the Caveats section in Chapter 2 indicates, Comte had originally called his science *la physique sociale*, a term that he uses interchangeably with *la politique positive* in his early writings (1883). It was because Quetelet "pirated Comte's phrase, *physique sociale*, as the title of his new science" that Comte was forced to choose the term *positivism* (Porter, 1986, 41). Further, as both Mortiz Schlick (1948), founder of the logical positivist movement and Comte's biographer Mary Pickering (amongst others) note, Comte's positivism *did not argue that quantitative approaches were the best means to understand the social world*. He says this explicitly in the Opuscles: "*On peut établir en principe que jamais l'analyse mathématique ne saurait étendre son domaine au delà de la physique des corps bruts, dont les phénomènes sont les seuls qui offrent le degré de simplicité, et, par suite, de fixité nécessaire pour pouvoir être ramenés à des lois numériques*" (162-16). (Translation: We can establish in principle that mathematical analysis could never extend its domain beyond the physics of raw bodies, the only phenomena which offers the degree of simplicity and, consequently, of fixity necessary to be able to be reduced to numerical laws.) While his science was modelled on physics, this was in the sense of the pursuit of natural law as Comte (1883) himself notes in his definition of positivism as: "*la science qui a pour objet propre l'étude des phénomènes sociaux, considérés dans le même esprit que les phénomènes astronomiques, physiques, chimiques et physiologiques, c'est-à-dire comme assujettis à des lois naturelles invariables, dont la découverte est le but spécial de ses recherches*. (1883, 177). (Translation: The science whose specific object is the study of social phenomena, considered in the same spirit as astronomical, physical, chemical and physiological phenomena, that is to say as subject to invariable laws, the discovery of which is the goal of its research program.) It was the later logical positivist movement that gave positivism its current association as Schlick (1948) notes: "Every philosophical point of view is defined by the principles which it considers fundamental and to which it constant recurs in argument. But in the course of the historical development of such a view these principles tend to change... I should like to apply these considerations to the modes of thinking grouped together under the name 'positivism'. They have, from the time Auguste Comte invented the term until the present, undergone a development which furnishes a good example of what has just been said." (82-83).

*Les sciences d'observation ont pour objet l'étude des corps de la nature et des lois qui s'y rattachent. Elles procèdent par les mêmes voies, et les mêmes règles leur sont généralement applicables*⁶⁴ (1846, 237).

The second step involves the use of probabilistic techniques to analyze aggregate observations to eliminate the *forces perturbatrices* (or individual variances not representative of the underlying constant cause) from independent observations in order to reveal the constant causes beneath. Probability theory is able to do this because it:

*sert en effet à distribuer avec avantage la séries de nos observations, à estimer la valeur des documents dont nous faisons usage, à distinguer ceux qui exercent le plus d'influence, à les combiner ensuite de manière qu'ils s'écartent le moins possible de la vérité, et à calculer, en définitive, le degré de confiance qu'on peut attacher aux résultats obtenus*⁶⁵ (Quetelet, 1869, 137).

He suggests that the overall point of social science is to understand the causes that drive events with the goal of generating a model robust enough that it can accurately decipher the laws governing nature and predict the future or, in other words, conjure the Laplacean demon.

Analogous sciences and new social bodies

Aware of his heavy reliance on analogy to make the case for the importance of statistics in the trajectory of modern sciences, Quetelet, like Laplace, argues that the maturation of scientific disciplines is dependent on analogy:

*Il existe aussi une corrélation entre les sciences qui concernent l'homme dans ces deux ordres de choses; c'est-à-dire que deux sciences analogues marchent toujours de front et présentent les mêmes principes qui se traduisent à peu près de la même manière, en les appliquant soit au physique soit au moral*⁶⁶ (1848, XII).

Unlike Laplace, Quetelet is much more ambitious in his choice of scientific analogy. Although the secondary literature is correct to suggest that Quetelet bases his idea of social science on the

⁶⁴ Translation: Sciences of observation have for their object of study the bodies of nature and the laws associated with them. They proceed by the same paths and the same rules are generally applicable to them.

⁶⁵ Translation: ...serves in effect to advantageously distribute the series of our observations, to estimate the value of the documents we use, to distinguish those that exert more influence, to then combine them in a manner in which they differ as little as possible from the truth and to calculate, definitively, the degree of confidence that we can attach to our results.

⁶⁶ Translation: There exists as well as correlation between the sciences that concern people in these two orders of things: which is to say two analogous sciences always go hand in hand present the same principles which are translated in approximately the same way, by applying them to the physical or the moral.

‘analogue’ science of astronomy and metrology (weather prediction) because of his ongoing references to the idea of gravity, the scientific analogies that he uses in his texts are considerably more varied (Stigler, 1999). He effectively compares *la physique sociale* to every prestigious science in existence at the time that was not competing for similar analytical turf including physics, physiology, geometry, public hygiene and, perhaps most unfortunately, the ill-fated phrenology - which Quetelet effusively describes as “*un monument scientifique du mérite le plus incontestable*” (1848, 64). He also takes careful pains to distance his science from the substantively similar and relatively novel field of political economy which, at the time, was led by contemporary thinkers such as J.B. Say – describing it as a base and material science - which would have been its main competitor as a science for the social body (Quetelet, 1848).

Natural law, beauty and Nature’s nation

In addition to developing similar ideas about the utility of probability theory to ‘discover’ the natural processes driving the social world, Quetelet expands Laplace’s ideas about natural laws (and the capability of probability theory to detect them) directly to human political organization - offering a very clear and authoritative argument for the use of statistics to understand and govern human national populations. He does this by developing a theory for the ‘natural’ development of human political organization, stressing the importance of equilibrium for any naturally developed system.

Following Laplace, Quetelet’s theory is, once again, developed by analogy to the natural sciences. For Quetelet, the natural (non-human) world always inclines towards equilibrium by itself. Equilibrium, as a physical system, is driven by two key forces (which he refers to as “*forces vives*”): attractive and repulsive forces. Quetelet defines equilibrium as occurring in the natural world “*quand deux corps agissent l’un sur l’autre, les actions et les reactions sont égales*”⁶⁷ (1848, 294). The state of equilibrium is also scientifically defined by its beauty: “[I]a beauté consiste, au physique comme au moral, dans un juste équilibre entre nos facultés. Tout ce qui peut blesser cette harmonie est nécessairement vicieux”⁶⁸ (Quetelet, 1848, 277). Although this ideal may seem strange to us now, beauty was a very common scientific ideal during the time that Quetelet was

⁶⁷ Translation: ...when two bodies act on one another, their actions and reactions are equal.

⁶⁸ Translation: ...beauty consists, in the physical as well as the moral, in the just equilibrium between our senses. Everything that harms this harmony is necessarily vicious.

writing. Beauty was strongly linked to ideas about objectivity and the true state of nature, both the result of equilibrium and an indicator of its presence (Daston and Galison, 2007).

Quetelet argued that equilibrium in the social world was different. He suggested that this was because humans have superior moral and intellectual capacities and are also much more sociable than any other creature in nature. He argues that humanity's extreme sociability allows for more complex types of social organizations, facilitating the development of science and art.

*L'homme se distingue encore par un autre privilège. Il est éminemment sociable il renonce volontairement à une partie de son individualité, pour devenir fraction d'un grand corps, qui a sa vie aussi et ses différentes phases. Une pareille agrégation d'hommes forme un peuple; et quand ce peuple possède un territoire et un gouvernement, il constitue un état*⁶⁹ (1846,260).

Quetelet refers to human political organization generally as the *corps social*. Writing before Darwin's theory of evolution, he argues that the *corps social* follows a progressive process of maturation installed by nature. The *corps social* is, therefore, subject to growth and death like any other natural 'body'. Quetelet argues that it naturally passes through different, increasingly complex stages of organizational development, all governed by a 'natural law' that Quetelet calls the *loi de croissance*. This law refers not to numerical growth (an idea related to pre-Darwinian ideas about species) but to the complexity of social organization. He claims that there are several, natural stages of human political organization that are defined by an increasing rejection of individual liberty in favour of larger forms of collective social organization. He identifies four major stages in the natural development of the *corps social* that increase in size and complexity as they progress, moving from *individuals* to *people* to *nations* and, finally, *humanity*.

Quetelet connects this idea of human progress to Laplace's idea of natural law by arguing that the use of probability theory to analyze aggregate observations of people would allow scientists to understand the natural laws that drive the *corps social* - a body completely divorced from the idiosyncrasies of the individuals from which it is comprised and subject, therefore, to different laws:

Le corps social, comme les individus, comme les états, a sa vie particulière, et ses phases de développement. L'histoire générale, l'histoire des sciences et celle de la philosophie,

⁶⁹ Translation: Man is distinguished by another privilege. He is eminently sociable and he renounces a part of his individuality, to become a fraction of a larger body, that has its own life as well and its own different phases. Such an aggregation of men forms a people; and when this people possesses a territory and a government, it constitutes a state.

*ont la noble mission de nous le représenter, dans la succession des temps, sous le triple rapport du physique, de l'intelligence et du moral*⁷⁰ (1846, 262-263).

Most importantly for the purposes of this analysis, within the progressive, natural development of the *corps social*, Quetelet defines a nation as

*un corps composé d'éléments homogènes qui fonctionnent avec unité et qui sont animés d'une même principe vital. Ce corps naît, se développe, passe par les différentes phases qui présentent les êtres organisés, et paye comme eux son tribut à la mort*⁷¹.

Here, I would like to stress that Quetelet is very much suggesting that nations are a political human grouping put in place by Nature herself, that are *different from* and exist *prior to* governments and states. As a result, he argues that one nation can have multiple states and governments (even at the same time):

*Une nation peut, sans cesser d'exister, changer la forme de son gouvernement; c'est ainsi que la nation romaine a vu se succéder la royauté, la république et l'empire; elle peut aussi se fractionner en différents États, comme anciennement la nation grecque et, dans les temps modernes, la nation allemande*⁷² (1848, 147).

He even offers clear instructions for which aspects of the nation, as a natural human political grouping, should be studied: “*Pour le bien connaître, il faut l'étudier comme nous avons étudié l'homme isolé, sous le triple rapport des qualités physiques, morales et intellectuelles*⁷³” (1848, 144-145).

In keeping with the revolutionary logic of the time, he argues that a hierarchy of political forms also exists that moves from monarchy (the most rudimentary form of government) to constitutional government and, finally, republic and empire. He ties the success of a nation to its state of equilibrium: “*Pour qu'une nation soit puissante, il faut que toutes les parties de ce grand corps fonctionnent dans un juste équilibre*⁷⁴” (1848, 148).

⁷⁰ Translation: The social body, like individuals, like states, has its particular life and its phases of development. General history, the history of sciences and that of philosophy, has the noble mission representing these phases for us, in the succession of time, under the triple relation of the physical, the intelligent and the moral.

⁷¹ Translation: A body composed of homogeneous elements that function as a whole and that are animated by the same vital principle. This body is born, develops through different phases that present organized beings and like them pays its tribute to death.

⁷² Translate: A nation can, without ceasing to exist, change the form of its government; this is how the Roman nation saw its succession to royalty, the republic and empire; it can also be divided into different states like the ancient Greek nations and, in modern times, the German nation.

⁷³ Translation: To know it well, you have to study it like we have studied the isolated man, under the triple relation of physical, moral and intellectual qualities.

⁷⁴ Translation: For a nation to be powerful, all of the parts of this great body must function in equilibrium.

According to Quetelet, the *corps social*, like any other natural body, can become diseased and falter from the path set for it by nature. Specifically, he follows Rousseau in characterizing European aristocratic society, particularly the French *Ancien Régime*, as an aberration of nature – a monstrous form of social organization that had diverged completely from the path set for it by Nature (Quetelet, 1848, 259). He contrasts European aristocratic society with non-aristocratic, European people and people with non-European heritage who, he argues, are a more equilibrated combination between ‘natural people’ and ‘civilization’. Quetelet thinks that progression through the various stages of the *corps social* must be done in a graduated and measured manner or various types of violence will arise. If a *corps social* becomes diseased, he argues that it will eventually correct itself. As an example, Quetelet argues that the violence of the French Revolution resulted from the extraordinary disequilibrium of the *Ancien Régime*.

*Pour que le système social présente les conditions les plus favorables, il faut qu’il existe un parfait équilibre entre l’individualité, la nationalité et l’humanité. L’un de ces trois états ne peut prendre de prépondérance qu’aux dépens des deux autres: l’individualité trop forte rend la nationalité impossible; de même, une nationalité trop prononcée absorbe l’individualité et place un peuple en dehors de l’humanité*⁷⁵ (1848, 296).

For this reason, he laments both the violence inflicted by the *Ancien Régime* and of the French Revolution, but also sees the revolution as necessary, applauding its outcomes:

*Qui ne sait les dévastations, les excès et les crimes qu’a fait naître la révolution française? Que de choses et de personnes ont été s’abimer dans ce gouffre! Mais aussi quelle influence immense ce changement brusque n’a-t-il pas exercé sur la marche de la civilisation! Tout en regrettant les sacrifices qu’il a fallu faire, ne doit-on pas s’applaudir des résultats qu’on a obtenus*⁷⁶? (1848, 293)

Revolution is, however, a last resort. The best path for the *corps social* is the path already set for it by Nature which Quetelet believes is a path *revealed only* through quantitative methods and theory promoted by his intellectual project: *la physique sociale*. This new social science

⁷⁵ Translation: For the social system to present the most favourable conditions, there must be a perfect equilibrium between the individual, nationality and humanity. One of these three states cannot take preponderance over the other two; overly strong individuality renders the nationality impossible; similarly, an overly pronounced nationality absorbs individuality and places people outside of humanity.

⁷⁶ Translation: Who does not know the devastations, the excess and the crimes that the French Revolution birthed? That things and people were lost into this abyss. But also what immense influence and rapid change did it not exercise on the march of civilization! Regretting the sacrifices that were made, should we not applaud the results that we obtained?

should be used to infer the ‘natural’, constant causes that drive the development of the *corps social* and ensure that it is kept in equilibrium through scientifically informed governance:

Le corps social, comme les individus, comme les états, a sa vie particulière, et ses phases de développement. L’histoire générale, l’histoire des sciences et celle de la philosophie, ont la noble mission de nous le représenter, dans la succession des temps, sous le triple rapport du physique, de l’intelligence et du moral ⁷⁷(1846, 262-263).

The governments of nations should regularly assess the physical, intellectual and moral state of their nations using *la physique sociale* and intervene should the course diverge too significantly: “*Les gouvernements ont donc comme les individus leurs conditions d’équilibre; et il est des indices auxquels on peut reconnaître si cet équilibre est stable ou non stable*” ⁷⁸(1848, 290).

Homme moyen: technique and interpretation

What quantitative indices could be used to assess the nation to ensure that it is on the path set for it by nature? Here it is important to note Carnap’s (1974) observation that mathematics is just a *language* used to describe nature and not a *feature* of it. I argue that Cole’s (2000) perennial question of statistics - what do these numbers actually *mean* about the thing being studied? what is their *interpretation*? - is historically situated and dynamic in the sense that interpretations of the same mathematical techniques have changed over time, a phenomenon noted in the secondary literature on the history of statistics (Gigerenzer et al, 1989; Porter, 1986; Desrosières, 2008a).

In Quetelet’s time, the most advanced quantitative technique that had been applied to human population counts at that point was basic arithmetic, which was certainly very effective but not very complex. The application of more sophisticated quantitative techniques, even if they may not seem sophisticated to us now, required an *epistemological justification* for their use as well as significant reflection on what these quantitative metrics imported from other academic domains *could actually tell us about what was going on in the social world*, requiring the development of new interpretations of the techniques themselves. In this section, I examine both the

⁷⁷ Translation: The social body, like individuals, like states, has its particular life and its phases of development. General history, the history of sciences and that of philosophy has the noble mission to represent them, in the succession of time under the triple relation of the physical, intellectual and moral.

⁷⁸ Translation: Governments, therefore, like individuals have their conditions of equilibrium; and there are indices that we can use to recognize if this equilibrium is stable or not.

epistemological justifications for Quetelet's use of quantitative metrics to describe human populations as well as his suggestion for a general program of applied statistics for political use.

In order to gauge the state of the nation, Quetelet develops a series of measures that he believes can be used to quantitatively assess the 'truth' of the nation. The most famous of these is *l'homme moyen* or a kind of population average meant to indicate the physical and mental characteristics of the nation. Quetelet argues that *homme moyen* is a kind of centre of gravity – the centre of the Gaussian (normal) curve - of the *corps social*. He defines it as:

*le représentant de toute notre espèce et comme portant en lui la moyenne de toutes les qualités qu'on trouve chez les autres, l'homme prendra pour nous le nom d'homme moyen; il peut être plus grand et plus fort dans un pays que dans un autre, comme il peut être aussi plus ingénieux, plus instruit ou bien encore, doué d'une moralité plus grande*⁷⁹ (1846, 147).

Drawing directly from Laplace's epistemological ideas, Quetelet intends *homme moyen* as a metric that eliminates the *forces perturbatrices* present in individual cases, enabling a true representation of the nation's 'natural' state of equilibrium. The important point here is that although the technique used to generate *homme moyen* is exactly the same as any average that we use currently (the outcome of the sum of all of the components in a list divided by the total number of items) and consistent over time, the interpretation of *homme moyen* was *very different*.

Quetelet's *homme moyen* is informed by norms of scientific objectivity present at his time of writing as well as his own epistemological justification for the application of probability theory to human populations. For this reason, even though Quetelet's *homme moyen* uses the same mathematical techniques as a simple average (add together all of the observations and divide by the number of observations), it is emphatically not an 'average' because its interpretation was different. Instead of representing the traits held by the majority of people in a given population, Quetelet understands *homme moyen* as an ideal type, an otherworldly perfection from which all existing copies are poor imitations which *by definition can never exist in reality* let alone be representative of the majority.

Quetelet famously uses a statue metaphor to illustrate both the concept of *homme moyen* and the Gaussian error curve to describe the distribution of traits in the actual population that he believes resulted from it (1846). As a brief reminder, the Gaussian error curve had been introduced

⁷⁹ Translation: The representative of our entire species, including the average of all the qualities that we can find in others, man will take the name of the 'average man'; he could be larger or stronger in one country than another, as he can be smarter, more instructed or even gifted with greater morality.

by the mathematician Gauss to estimate measurement error and identify the actual value of a phenomena. Gauss had developed this technique when he was taking multiple measurements of the same planet and was attempting to ascertain its true value. The idea was that if you take multiple measurements of the same phenomena, they would all be slightly off but in a way that was consistent so that the majority of measurements would be very close to the true value (either slightly above or below it) and gradually fewer measurements would be further off from the true value (again, either below or above it). Gauss assumed that if you were to chart an infinite number of measurements of the same phenomena, the distribution of individual measurements would approximate a bell-shaped curve (Gigerenzer et al., 1989). Despite some controversy (as it was based on an assumption), Gauss' estimation of measurement error had been made into a law and Laplace had famously modified its formula as part of his central limit theorem (Krüger, Daston and Heidelberger 1987; Adams, 1974; Desrosières, 1998).

Quetelet is notable because he took Gauss' error curve, as interpreted by Laplace, and incorporated it into the study of human political populations (which Laplace had not done) and connected it explicitly to the study of the nation which he understood as a natural type of human organization. Using the statue analogy, *homme moyen* is a perfect statue, a national ideal type cut by Nature herself for every nation, unattainable in reality, yet the mold from which every person in any given nation is cut. Quetelet claims that people cut from *homme moyen* are inexact, flawed replicas of *homme moyen* distributed according to Gauss' law of errors with *homme moyen* at the center (1846, 135). Quetelet connects this distribution to Laplacean social science by suggesting that *homme moyen* is the constant cause of nature and the Gaussian error distribution reflects the actual distribution of traits in the population made so by *causes perturbatrices* that slightly modify each replication (Porter, 1986, 63).

Quetelet is clear that national comparability is one of the main goals of statistics. He justifies this by likening it to the existing and, at the time, very prestigious science of comparative anatomy (1848, 234).

Le premier pas à faire dans la série de nos recherches serait de déterminer l'homme moyen chez les différentes nations. Peut-être nous accordera-t-on la possibilité d'une appréciation pareille pour les qualités physiques, qui admettent directement une mesure;

*mais quelle sera la marche à suivre pour les qualités morales et pour les qualités intellectuelles*⁸⁰ (155).

Quetelet is also clear that *homme moyen* can only be calculated at the national level and does not apply to averages of smaller groups within the nation, which he calls *moyenne arithmétique* (1846, 139). He claims that different *hommes moyens* exist for different stages of the *corps social* and that the measure should vary between nations. The *homme moyen* of all humanity is an average of all of the different national *hommes moyens*. Therefore, more than just a national measure, *homme moyen* literally becomes a type of species – the mathematical ideal-type of nations:

*Parmi les admirables lois que la nature attache à la conservation de l'espèce, je crois pouvoir mettre en première ligne celle de la conservation du type, par la connaissance de l'homme moyen. Mais, si je ne me fais illusion, ce que l'expérience et le raisonnement m'avaient fait reconnaître, prend ici le caractère d'une vérité mathématique*⁸¹. (1846, 137-138)

Quetelet empirically ‘confirms’ his theory by examining the distribution of the measurements of 3,738 Scottish soldiers’ chests that he had managed to obtain. He finds that the distribution of measurements of chests follows the Gaussian curve, and he accepts this demonstration as confirmation both for the existence of *homme moyen* as a natural ideal type as well as the existence of the Gaussian error curve as a natural distribution that exists everywhere in Nature all the time.

*L'exemple que je viens de citer mérite, je crois, toute notre attention: il nous montre que les choses se passent absolument comme si les poitrines qui ont été mesurées avaient été modelées sur un même type, sur un même individu, idéal si l'on veut, mais dont nous pouvons saisir les proportions par une expérience suffisamment prolongée. Si telle n'était pas la loi de la nature, les mesures ne se grouperaient pas, malgré leurs défauts, avec l'étonnante symétrie que leur assigne à loi de possibilités*⁸² (1846, 137).

⁸⁰ Translation: The first step to make in our research process will be to determine the average man of all the different nations. Perhaps we will accord the possibility for a parallel assessment of his physical qualities, which are easy to measure; but how will be assess moral and intellectual qualities.

⁸¹ Translation: Among the admirable laws that nature attached to the conservation of the species, I believe it put the conservation of types first, through the knowledge of average man. But, if I am not deluding myself, what experiment and reasoning has made me recognize, here takes the character of a mathematical truth.

⁸² Translation: The example that I just mentioned merits all of our attention: it shows us it appears as if the chests that were measured were modelled on the same type, one the same individual – ideal, if you will – but of which we can know the proportions through a sufficiently long exposure. If this was not the result of a law of nature, the measures would not be grouped, despite their defects, with the astonishing symmetry assigned to them by the law of possibilities.

Quetelet's use of the Gaussian error curve would later influence Francis Galton's thinking on the distribution of variance in nature in *Natural Inheritance* (1846). In a *completely different interpretation* of exactly the same mathematical curve, Galton would later rename and reinterpret the Gaussian error curve the 'normal' curve in order to fit his ideas (that we now accept) that the average represents the majority. I will examine some of the debate around the application of the Gaussian curve to national populations in the next chapter.

Although it may seem a strange interpretation now, Quetelet's suggestion that *l'homme moyen* is an ideal type put in place by natural law draws heavily on the 19th century conventions surrounding early ideas of objectivity discussed by Daston and Gallison (2007). During the 18th/19th centuries, they describe a type of objectivity called 'truth-to-nature', an approach which saw the typical phenomena as "those that hearken back to some underlying types or archetypes and from which individual phenomena could be derived" that was "rarely, if ever embodied in a single individual" (Daston & Gallison, 2007, 69). These archetypes existed within the ideal realm and were only visible to the trained observer through exhaustive observation of the same phenomena (60-63) – an idea that is certainly compatible with Laplace's constant and irregular causes. Further, in the case of pictorial representations in books of anatomy or naturalism, representations of nature actively sought beauty in their depictions, which is likely why Quetelet describes *homme moyen* and the ideal of equilibrium as beautiful because it is a rhetorical means to impress the veracity of his novel concepts on the readers of his time (Daston & Gallison, 2007, 102). This interpretation stands in contrast with the work of Switjtink (1987, 261) and Porter (1986) who argue that early statistics promoted a form of what Daston & Gallison (2007) call *mechanical objectivity* understood as a way to remove human subjectivity from social measurement through the rigorous use of a particular technique. Based on my reading, I argue that there is significant overlap between these two forms of objectivity. I believe that Quetelet was drawing on every authoritative 'scientific' argument that he could think of to promote the use of statistics and his novel concept of *physique sociale*.

Beyond his theoretical application of probability theory to nations, the other goal of Quetelet's works was to target academic, governmental and amateur enthusiast communities in order to convince them to accept *la physique sociale* and statistics as a true scientific discipline. This was necessary because his arguments were novel and the application of more complicated mathematical techniques to population lists needed to be justified. He is emphatic that statistics should not be characterized simply as mere counting *because he believed probability theory was capable of finding a kind of social gravity, the constant causes of Nature that drove social action*. He emphasizes this in several ways. First, he tries to persuade his audience to use statistics by stressing the existence of an intellectual consensus exists regarding statistics as a discipline: “[l]a plupart des hommes acceptent avec une égale confiance tous les documents statistiques⁸³” (1846, 298). He also plays on themes of international competition by emphasizing statistics as the hallmark of the modern nation-state and truly civilized government. He praises states that have already employed statistics to understand their populations: “[l]a Belgique et la Sardaigne sont entres les premières dans cette voie; les autres états civilisés finiront sans doute par suivre leur exemple⁸⁴” (1846, 364).

In order to encourage the use of statistics by political administrations, Quetelet also spends a considerable amount of time outlining the objectives and best practices of statistics so that his readers might adopt statistical practices and use them correctly and in a standardized way. In this way, his texts are similar to textbooks in that they outline a series of instructions, best practices and potential abuses of statistics meant to outfit the diligent student with ‘the right way’ to do statistics or, at least, do statistics the way that Quetelet intends. Here, it is important to note continuities between Quetelet's recommendations and current recommendations for statistical best practices as similarities do exist. Also notable in these recommendations is Quetelet's relative lack of hubris. Although he had previously made the audacious inference that he might be the second coming of Isaac Newton, in this discussion, Quetelet shows some degree of humility, spending

⁸³ Translation: Most men accept with equal confidence statistical documents.

⁸⁴ Translation: Belgium and Sardegnia are amongst the first on this path; the other civilized states will surely finish by following their example.

time to carefully identify the limits and potential abuses of statistical knowledge-generating tool for political governance. Quetelet is acutely aware of the potential for the users of statistics to merely “*enveloppent leurs idées d’un voile scientifique*”⁸⁵ (1846, 315) because of the traditional authority given to numbers – an insight that is ironically echoed in many current critiques of quantitative method and positivism. Quetelet admits that “*on peut trouver dans la statistique les moyens de défendre à peu près toutes les thèses. Ce sont ces abus de la science qui ont fait naître tant de doutes sur son utilité*”⁸⁶ (1846, 315). People who are “*profondement convaincues d’une vérité, cherchent à l’établir directement par l’autorité des chiffres, état en donner, comme elles pensent, une démonstration mathématique*”⁸⁷ (1846, 317). For this reason, he argues that the use of statistics in politics is potentially dangerous because: “[c]’est en politique surtout que la statistique devient un arsenal redoutable, ou les parties belligérantes vont également choisir leurs armes”⁸⁸ (1846, 315).

Yet his solution for the potential abuses of statistics is not based on the strict adherence to a particular statistical protocol under the belief that the mathematics had successfully automated reason. Rather, Quetelet’s solution is based on the cultivation (and standardization) of the individual discretion (or educated know-how) of the statistical user, an idea that reflects the debate present in the history of probability between individual discretion and the automation of reason through math:

*La statistique a la mission d’apprécier la valeur des documents qu’elle rassemble et d’en déduire des conclusions... il faut savoir les mettre en œuvre avec intelligence, en déduire des principes utiles et juger de la stabilité de l’édifice social par la connaissance intime de sa manière d’être*⁸⁹ (1846, 102-103).

The discretion of the individual user should be developed according to four major principles:

Dans la composition des ouvrages statistiques, il faut considérer plusieurs choses essentielles: 1) les questions à poser; 2) les modèles à remplir; 3) les moyens de contrôle;

⁸⁵ Translation: shroud their ideas in a scientific veil

⁸⁶ Translation: we can find in statistics the means to defend almost every thesis. These are abuses of science that will birth many doubts on its utility.

⁸⁷ Translation: profoundly convinced of a truth, will seek to directly establish it through the authority of numbers, as if they were conducting a mathematical demonstration

⁸⁸ Translation: It is in politics above all where statistics becomes a formidable arsenal, where belligerent parties will choose their weapons.

⁸⁹ Translation: Statistics has the mission of appreciating the value of the documents that assemble it and deduce conclusions from them... They must be put into operation with intelligence, deducing the useful principles and judging the stability of the social edifice through the intimate knowledge of its manner of being.

4) la formation la plus avantageuse des tableaux destinés à recevoir de la publicité⁹⁰ (1846, 289).

In order to ensure consistency in practice, Quetelet further expands on these principles. Much like statistical texts today, he argues that the development of the survey tool itself must include clear definitions and be informed by the existing research on the topic. He indicates several principles that define good statistical questions:

Les principales considérations qui doivent guider une administration dans les questions à poser, sont les suivantes: 1) Ne demander que des renseignements absolument nécessaires et qu'on est sûr de pouvoir obtenir; 2) Éviter les demandes qui peuvent exciter la méfiance et blesser des intérêts locaux ou des susceptibilités personnelles; de même que celles dont l'utilité ne serait pas suffisamment appréciée; 3) Être précise et clair, afin que les demandes soient comprises partout de la même manière, et que les réponses soient comparables..... Adopter, dans cette vue, des modèles uniformes qui puissent être uniformément remplis.; 4) Faire recueillir les documents de telle sorte que les vérifications soient possibles⁹¹ (1846, 289-290).

Quetelet also provides detailed instructions for the proper interpretation of statistical manipulations. He argues explicitly that before interpreting any given statistic “il est donc bien important de savoir comment les documents sont recueillis et ce qui peut garantir la régularité des inscriptions⁹²” pointing clearly to the importance of organizational structure and knowledge of the practical work of data collection in the construction of statistical systems (1846, 200). He argues this because he is aware that “[l]es données statistiques peuvent donc être altérées dans leur source et dans les canaux qui nous les transmettent⁹³” (1846, 301). He cautions his readers that care must be used to establish clear definitions of phenomena that researchers hope to investigate because, for example, “le mot crime est très-vague; ce qui est réputé crime ici, ne l'est peut-être pas de l'autre côté de la frontière. C'est une première difficulté quand, sous ce rapport on veut comparer

⁹⁰ Translation: In the composition of statistical works: one must consider many essential things: 1) the question posed; 2) the templates to be filled out; 3) the means of control; 4) the most advantageous formation of tables destined intended for the public.

⁹¹ Translation: The principle considerations that should guide an administration in the questions they pose are the following: 1) Ask only for information that is absolutely necessary and that they are sure they can obtain; 2) Avoid questions that could invite distrust and hurt local interests or personal sensitivities; also those whose utility is not sufficiently appreciated; 3) Be precise and clear, so that questions are constructed in the same manner, and whose responses are comparable.... In this view, adopt standardized models that can be uniformly filled out; 4) Collect documents of such a type that verification is possible.

⁹² Translation: It is therefore very important to know how these documents were collected and what can guarantee the regularity of registrations.

⁹³ Translation: Statistical evidence can be altered at the source or through their transmission channels.

*un pays à un autre*⁹⁴ (1846, 335). He is clearly aware of the importance of regional customs and stresses that knowledge of regional customs and terms must be included in the interpretation of official averages. He further outlines a number of rules, phrased as things to be avoided, for the interpretation of social data that has been collected. These rules include:

*1) Avoir des idées préconçues sur le résultat final; 2) Négliger des chiffres qui contrarient le résultat qu'on voudrait faire prévaloir; 3) Énumérer incomplètement les causes et n'attribuer qu'à une seule cause ce qui appartient au concours de plusieurs; 4) Comparer des éléments qui ne sont pas comparables*⁹⁵ (1846, 313).

He also suggests various ways to establish the “precision” of any given calculation of *homme moyen*:

*En général, pour reconnaître, sans recourir aux théories mathématiques, le degré de précisions auquel on est parvenu dans le calcul d'une moyenne, il suffit de partager l'ensemble des valeurs observées en deux ou plusieurs groupes, dont on prend séparément les moyennes; et si ces moyennes diffèrent peu entre elles, on peut les regarder comme étant très précises*⁹⁶ (1846, 303).

In providing a series of principles for the use and interpretation of statistics, Quetelet follows a tension present in the history of probability between the accuracy of human reason and the accuracy of the outcome of a mathematical process. Which one is objective or best represents what is really going on in nature? Ultimately, Quetelet argues that individual discretion, in both data collection and analysis, is more important for the accuracy of statistical processes than the simple use of mathematics to understand social phenomena. A viewpoint that runs contrary to the probabilist ambition of using mathematics to automate human reason. He justifies this choice by referring to the strong potential for the abuse of mathematics given their political purpose and the scientific authority attributed to numbers as well as the strong potential for inaccuracies in the data itself due to the need to ensure precise definitions of key research terms and questions.

⁹⁴ Translation: The word ‘crime’ is very vague; that which is reputed a crime here, is not on the other side of the border. That’s the first difficulty when, in this respect, we want to compare one crime with another.

⁹⁵ Translation: 1) Have preconceived ideas on the final result; 2) Neglect numbers that contradict the result that you were hoping for; 3) Incompletely enumerate the causes and attribute to one cause that which is brought into being by many causes; 4) Compare elements that are not comparable.

⁹⁶ Translation: Generally, to recognize, without appeal to mathematical theories, the degree of precision reached in the calculation of the average, it suffices to share all the observed values in two or more groups, from which we separately calculate the averages; and if these different averages do not differ substantially between each other, we can say they are very precise.

Summary: Probability theory and population counts

This chapter discussed the results of my analysis of historical texts written by Laplace and Quetelet that were used to develop an epistemology for social statistics. These texts are important because they later influenced the ISI's thinking about social statistics, which I will discuss in the following chapter. At the time that they were writing, both Laplace and Quetelet's arguments were necessary because quantitative approaches like the Gaussian error curve had not typically been used to interpret population counts. As a result, their use needed to be extensively justified and also codified. The justification for the use of mathematical ideas for the interpretation of social lists was done exclusively by analogy because analogy was understood to be one of the primary motors of scientific progress. Laplace bluntly assumed that the social world was analogous to the natural world - an observation that has been noted by many of his biographers and the secondary literature on statistics - so that he could apply his notion of probability to it. He posited that gravity - a law of the natural world - also existed in the social world and a kind of 'social gravity' could be 'revealed' using the same methods. These methods were quantitative and involved the analysis of multiple observations of the same phenomena in order to find the underlying natural law. Multiple observations were necessary because Laplace believed that each individual observation was distorted. If multiple observations of the same phenomena were aggregated together, he proposed that they would be distributed according to Gauss' error curve and the mean of this curve would represent the true value of the phenomenon under study.

Extending observations made by Gigerenzer et al. (1989), Porter (1986), Desrosières (2008a), I argue that Quetelet adopted and extended Laplace's epistemological framework for social statistics and integrated the nation into these epistemological arguments as an ideal type of Nature. I demonstrate how Quetelet extended Laplace's arguments by developing concrete metrics that could be used to analyze aggregate observations and their social interpretations and providing suggestions for organizational structure, work practice and ethical protocol that could be implemented by national statistical bureaus so that their statistical data could be considered accurate. I demonstrate that Quetelet's epistemological arguments for social statistics made the nation into an ideal type, whose 'true' existence was *literally only visible through the use of quantitative methods and probability theory* - an idea about scientific objectivity that I argue is reflective of Daston and Galison's (2007) 'truth-to-Nature' approach.

CHAPTER 6: THE BULLETIN OF THE INTERNATIONAL INSTITUTE OF STATISTICS (1886-1912) AND THE DEVELOPMENT OF STATISTICAL SYSTEMS TO CONSTRUCT THE NATION-STATE

In this final analytic chapter, I investigate one of the early fora in which statistical techniques about the study of the nation-state was developed: the International Institute for Statistics. This institute was one of the premier 19th century statistical societies where some of these discussions took place. Founded by Quetelet after an initial international statistical congress in 1853, the organization hosted annual congresses and published the results in their Bulletin – the empirical data source for this chapter. These congresses united statisticians, mathematicians and government representatives from Europe, Argentina, Brazil, Canada, the United States and Japan who were all dedicated to the development of the 19th century statistical project explicitly following Quetelet's ideas described in the previous chapter. The Bulletin contains organizational decisions, academic papers and, in some cases, transcripts of conversations (verbatim or summarized) held at these statistical congresses – a veritable wealth of information about 19th century statistical thought. This material identifies not just the key historical figures responsible for different statistical projects but also the debates and decision-making processes that led to the adoption or rejection of particular ideas or techniques. The IIS Bulletin thus provides a rich empirical case that can be used to observe 1) the processes by “which [a selection of statistical] practices became institutionalized” and 2) the processes by which scientifically “produced matters of fact were made into the foundations of what counted as proper scientific knowledge” (Shapin, 2010, 1).

This chapter allows me to continue my investigation of Desrosières' (2002; 2008a; 2008b) process of social quantification which involves the establishment of conventions of equivalence between mathematical techniques and social information about the nation-state that were used to generate metrics summarizing trends in the data. This process involves the epistemological justification *for the application of mathematical techniques to social phenomena* (i.e. Why can we even use these techniques at all?) as well as *the creation of standardized lists and metric interpretation* that would be used by a community of experts to objectively build the nation (i.e. What do these metrics mean in relation to the nation?). In the case of social statistics, these interpretations answer questions like: what does the single numerical outcome (ex: 5) of some quantitative manipulation *mean in relation to the nation?* What does it reveal to us about what is

'really happening' in the aggregate nation and why? The examination of these texts allows me to develop the explicit connection between the practice of statistics and nation-building through an examination of the assumptions and debates that led to the adoption of standardized lists and metrics.

The analysis of the IIS is my novel, empirical contribution to the STS and history of statistics literatures. My quantitative and qualitative analysis was based on the following questions:

- 1) What general topics were the IIS interested in knowing about?
- 2) How were statistical institutions, social categories and statistical metrics developed and made meaningful for the study of national populations?

I used a quantitative content analysis of the table of contents of each volume to answer the first question and an analysis of specific article codes (derived from the first analysis) to answer the second. I chose 1886 to begin my content analysis because that was the first issue of the Bulletin. I chose 1912 as the cut off year because the journal stopped publishing in the lead up to and duration of the First World War. I also relied on a supplementary index published in 1924 that summarizes the content of the first thirteen issues thematically.

I performed the quantitative content analysis by coding the articles listed on each issue's table of contents according to a set number of themes that I inductively developed and refined as the coding process continued. My content analysis was multilingual (English, French, Italian and German) reflecting the multilingual nature of the journal during this period. There were only five full academic articles in German – a language I do not read. I sent the titles to a German-speaker and had them translated and coded the articles based on that translation. I grouped the final codes for the quantitative analysis into two major categories: *substantive* and *procedural*.

The codes in the *procedural* category relate to any article that dealt with the administration of the IIS conference or the organization itself. There are three codes: IIS internal, conference proceeding, necrology. Examples of the titles of articles or sections addressed by these codes include: *Assemblée générale: Motion d'ordre; Nécrologies; Ordre du jour* and *Fêtes et excursions*. Again, the Bulletin was the result of a recurring international conference, and the procedural category includes those articles whose substance deals with the practical administration of the conference or organization. I excluded these codes from my analysis.

In the *substantive* category, I developed codes that related to the subject that the article was discussing. The codes included: *agriculture and food; births, deaths and marriages; bureaucratic organization of statistics; city statistics; legal theory; economics, finance and property; education; graphical representation; health, historical statistics; imm/em-igration; labour and workers; miscellaneous; national population and international comparison; poverty and pauperism; press; statistical theory and transport*. The IIS article titles are quite literal. Often, although not always, the name of the code was mentioned in the article title itself or close synonym of the code (ex: penal statistics were categorized as ‘crime’). In order to capture the substantive nuances in each article, each article could be classified in three different ways, although the vast majority were categorized using only one category. Examples of titles of articles included in this section include: 1) *Fécondité du mariage, rapport de la 1re section, présenté par M. Kiaer*; 2) *L’émigration portugaise, par M.O. Martins*; 3) *Lo studio della delinquenza e la classificazione dei reati nell statistica penale*⁹⁷ *del Dr. A. Bosco*. Based on my quantitative analysis, I selected specific substantive codes that are directly relevant to my research question and analyzed the texts contained within. I chose the three most relevant quantitative codes for my inquiry – *statistical theory, bureaucratic organization of statistics* and *national population and international comparison*. This chapter argues that 19th century statistics ‘built’ as opposed to ‘found’ the nation and should be understood as a technique of nation-building by elaborating on the various ways that Quetelet’s epistemological vision was incorporated into the early statistical techniques promoted by the ISI, particularly through the projects of standardization of measures for the purposes international comparability. I find that during this period of statistical history, the major problem of standardization was largely social and qualitative, not mathematical.

Argument:

This chapter is based on a quantitative content analysis of the IIS Bulletin between its formal founding in 1885 to its temporary suspension just before the First World War (1886-1912). It enables me to further the major argument of this dissertation: that 19th century statistics should be understood as one of the techniques of nation building that promoted the nation as a natural

⁹⁷ This roughly translates as “the study of delinquency and the classification of offenses in penal statistics”.

(literally) and objective unit of social organization and development. The interesting twist was that the nation that they were hoping to ‘find’ was *only* detectable through the technique being developed to aggregate it. Instead of ‘finding’ the nation, I argue alongside Desrosières (2008a;2008b) and Curtis (2002), that the IIS was actually ‘constructing’ it based on Quetelet’s epistemological ideas about natural law, *homme moyen* and the *corps social*.

As a corollary of this argument, I elaborate on the ways that the IIS integrated international comparability into their statistical project so that their statistical results would be meaningful according to Quetelet’s epistemological vision. I claim that the ISI’s goal of international standardization promoted a form of methodological nationalism or “...the naturalization of the global regime of nation-states by the social sciences” by encouraging institutional and technical *conformity* amongst the statistical criteria (lists and metrics) used to assess nation-states so that they could be compared (Wimmer & Glick Schiller, 2003, 576). Further, I contend that during this period of statistical history *the major problem of standardization was largely social and qualitative not mathematical*. Discussions held by the IIS focused on ensuring that *the national social systems behind the construction of statistics* – the national bureaucratic structures (not just of statistical institutes but of all bureaucratic organizations submitting data), workers and working conditions, data reporting norms, translations between national languages, national list category groupings and laws– could be calibrated in roughly same way. The IIS spent considerable energy discussing how different national contexts could be ‘translated’ into a common statistical language so that the same list category and quantitative metric ‘referred’ to more or less the same ‘referent’ or ‘social object’ and could be compared – otherwise statistical analysis would be limited to individual national (or regional) contexts and would be unable to furnish comparison.

The remainder of the chapter is structured in the following way. First, I begin with a brief description of the IIS as an organization: its members, mandate and early history. I then use the results of the quantitative analysis to answer the first research question: what general themes was the IIS interested in discussing between 1886 and 1912? It elaborates on the types of articles contained in the codes that are not examined in later parts of the chapter. It then moves on to answer the second question (how were statistical organizations, lists and metrics made meaningful for the study of national populations?) through an analysis of three codes: 1) *Statistical theory*, 2) *Bureaucratic Organization of Statistics* and 3) *National Populations and International Comparison* codes. I then examine Quetelet’s influence on the assumptions and institutional goals

of the early IIS through an examination of relevant articles contained in the statistical theory code and move on to an examination of the ISI's discussion of the organization of national statistical bureaucracies. Finally, I discuss the results of the National Populations and International Comparison code, focusing on the centrality of international standardization to the ISI's project with the goal of understanding how Quetelet's typological assumptions about the nation and the influence of natural law on social development informed the development of national list categories and metrics used to describe the people in them.

I conclude that many of the debates used to generate the statistical lists intended to 'scientifically' and 'objectively' demonstrate which groups constituted social reality were derived in this initial statistical phase from the perceptions of IIS members and the technical demands of the lists themselves. Debates around how exactly social categories should be applied for the purposes of statistical analysis demonstrate a fascinating and inconclusive oscillation between technique and substance, lived experience and social fact, theory and empiricism. Further, the debates around which statistical metrics should be used to best understand social phenomena and the construction of their interpretations yields insight into the connection between Quetelet's epistemological assumptions about the nation as well as 19th century norms of scientific objectivity. As the IIS issues progress, these discussions demonstrate a shifting epistemological landscape suggesting that Quetelet's influence waned in favour of Francis Galton.

The International Institute of Statistics (ISI) and its Bulletin

The *International Institute of Statistics* (ISI) is an academic society dedicated to the study of statistics that has been in operation since the mid-19th century and continues to exist today (ISI, 2022). The *Bulletin of the IIS* emerged out of a series of conferences initially convened by Adolphe Quetelet in 1853 in Brussels and was formally founded in 1885, the year before its first Bulletin (ISI, 2022). It is one of the oldest statistical journals in existence along with the *Journal of the Royal Statistical Society* (founded in 1834) and *Biometricka* (founded in 1901). Unlike these two journals - which tended to be more national or mathematical in scope, the IIS was *international* in membership and geographies studied – including European, Argentinian, Brazilian and Japanese representatives – and wished to extend the global scope of their membership. It is an excellent empirical source for understanding 19th century statistical thought on the nation-state – before

statistics was made into a fully mathematical discipline by Francis Galton and Karl Pearson⁹⁸ and the nation-state emerged as the dominant form of political organization.

The IIS was intended as an independent scientific organization fashioned in the style of the Institute of France (one of the elite revolutionary academic institutes founded during the French revolution that was discussed in Chapter 4). It included only high-ranking organizational representatives including university professors, government statisticians, military representatives and representatives of research institutes (Neumann Spallart, 1886). There were two presidents of the IIS during the period under examination in this study: Rawson W. Rawson (1885-1899) and Luigi Bodio (1901-1920). A review of the initial membership list from 1886 indicates that all the initial members were men (See Appendix 1). This is also evident in the article introductions where “*Hommes éminents*” or “*Meinen herren!*” are occasionally included as salutations.

During the late 19th and early 20th centuries (the period under examination in this chapter), the Bulletin was published two or three times per year. The content itself is a combination of conference proceeding minutiae (agendas, lists of membership and so on), rough transcripts of conversations that occurred at meetings and formal academic articles. The journal’s format becomes more standardized as the issues progress. Sometimes formal academic articles bleed into summaries of conversations held on that topic in multiple languages without warning. This obviously makes sense as it was one of the first statistical journals and norms for writing about statistics were being established. It is important to note here that the journal relies heavily on *qualitative (typically in French) and not quantitative language* to convey statistical ideas. The major language of the journal during the 19th century was French but it also contains a minority of articles written in English, Italian and German suggesting that French academic norms were most influential to the IIS in this early period. Each issue is between 200 to 400 pages long.

⁹⁸ The first department of statistics was established by Karl Pearson at University College London and was based on a program of study informed by mathematics and eugenics – the pseudoscience founded by both Karl Pearson and Francis Galton. Many early statistical concepts, like regression, were initially developed with reference to eugenic concepts and problematics: “Galton provided, in the concepts of regression and correlation, the key tools for the treatment of two dependent variables, and made the advance to the general treatment of any number of dependent variables a relatively easy technical problem. His work in this area arose directly from his eugenic concerns” (Mackenzie, 1981, p.59).

WHAT GENERAL THEMES WAS THE IIS INTERESTED IN KNOWING ABOUT BETWEEN 1886 AND 1912?

The results of my quantitative content analysis of the substantive codes respond to this first question. When the procedural codes (*IIS internal*, *Conference Proceedings* and *n/a*) were removed, there were 15 substantive codes and 515 articles in my analysis based on the primary article classification only. As previously mentioned, all codes were inductively generated based on the title of the article. Although the format of the IIS was not standardized, the article titles tended to provide very literal descriptions of the article content and became more standardized as the issues progressed. There is some conceptual overlap between different categories which is why I categorized articles three different ways. This can be expected given that these are the first issues of an academic statistical journal. I intentionally disaggregated codes dealing with economic issues into those codes dealing with people (*Labour and Workers* and *Poverty and Pauperism*) and those dealing with objects and the formation of economic metrics (*Economics, Finance and Property*). The frequency of the primary codes is illustrated below in Table 5. I will then briefly elaborate on the results of the codes that I do not discuss in the following section.

Table 5: Frequency of codes

Substantive Primary Codes	Definition	Count	Example article titles
Agriculture and Food	Articles that dealt with grains and cereals, fisheries or food supplies	32	<i>Évaluation de la récolte des blés d'après les données sur leurs états à l'époque de leur floraison</i> (1908); <i>Recherches statistiques sur l'alimentation ouvrière</i> (1905)
Births, deaths and marriages	Articles that dealt with births, baptisms, fecundity, deaths, mortality, the categorization of disease and marriages.	53	<i>La mortalità nei vari stadi della vita</i> (Mortality at various stages of life) (1898); <i>Progrès réalisés par la nomenclature international des causes de décès</i> (1903); <i>Y-a-t-il des périodes pour les mariages et les naissances comme pour les crises commerciales?</i> (1903)
Bureaucratic organization of statistics	Articles that attempt to describe statistical bureaucracy in various nation-states.	5	<i>Le développement des recherches statistiques en Égypte</i> (1908); <i>La nouvelle organisation du service statistique dans la République Argentine</i> (1894)
Legal theory	Any article dealing with legal theory and the development of national judicial systems not included in the national census	22	<i>Rapport sur la statistique judiciaire pénale</i> (1892); <i>Notizie sull'ordinamento del potere legislativo e sulle elezioni politiche nei principali</i> (1887); <i>Les bases mathématiques et statistiques de la condamabilité</i> (1908)
Economics, Finance and Property	Articles evaluating national budgets, economic metrics or property ownership	113	<i>Les banques d'émission et de dépôt</i> (1909); <i>L'évaluation de la richesse nationale</i> (1903); <i>Du poids comparatif des charges fiscales qui pèsent sur la propriété immobilière sur les valeurs mobilières en France</i> (1902); <i>Directions sur la manière de dresser les budgets d'ouvriers industriels et d'artisans</i> (1892); <i>Note sur la valeur des propriétés foncières en Suède</i> (1892)

Education	Any title related to the description of schooling systems	10	<i>Rapport sur la statistique de l'enseignement primaire</i> (1892)
Graphical representation and tables	Articles discussing the development of graphing and tabling techniques and their international standardization	8	<i>Statistique graphique</i> (1905); <i>Saggio di rappresentazione della densità della popolazione mediante curve di livello eseguito</i> (1888)
Health	Any articles related to disease or population health (not death)	24	<i>La statistique de la consommation de l'alcool</i> (1908); <i>La statistique des tuberculeux</i> (1905); <i>La statistique hypothécaire</i> (1909)
Historical Statistics	Attempts to reconstruct historical population sizes and characteristics using historical data or ancient censuses	5	<i>Histoire critique des travaux statistiques au Japon depuis l'antiquité jusqu'à la restauration impériale</i> (1912); <i>La popolazione di Roma antica</i> (The population of ancient Rome) (1886)
Labour and workers	Any articles related to workers' living or working conditions, strikes and professional classes	51	<i>Recherches sur les salaires et les conditions des ouvriers en Danemark</i> (1892); <i>Observations sur les conditions économiques de la classe ouvrière à Londres</i> (1892); <i>La questione operaia nel Belgio secondo l'inchiesta eseguita dalla commissione del lavoro istituita con Decreto reale de 15 aprile 1886</i> (1889)
Miscellaneous	This category includes inductively generated codes that had frequencies equal to or lower than five. Themes include: fires, anthropometry, biology, aristocrats, predictions of the future, the postal service, religion and electricity.	17	<i>Communication de M.F. Galton sur l'anthropométrie internationale</i> (1892); <i>Démographie de la noblesse suédoise</i> (1909); <i>La statistique et les sciences de la vie</i> (1909); <i>The Horoscope of the Population in the Twentieth Century</i> (1908)
National populations and international comparison	Articles that use international comparison to discuss the development of national statistical systems, particularly with regards to the national census. Themes addressed in this section include total population counts and population registers, im/em-igration, crime, exploratory statistical studies of colonized places	94	<i>Communication de M. Basillesco au sujet du chiffre de la population en Roumanie</i> (1898); <i>La démographie française comparé</i> (1898); <i>Dell'emigrazione dall'Italia comparata a quella che avviene da alcuni altri Stati europei</i> (1887); <i>L'émigration portugaise</i> (1892); <i>Statistique internationale de migration</i> (1903); <i>Proposition du Comité du dénombrement des populations non recensées</i> (1902); <i>Statistique de la superficie de la population des contrées de la Terre</i> (1897); <i>Sur les Explorations démographiques à exécuter dans les pays où il n'existe pas encore de recensement et sur l'organisation d'une statistique internationale régulière du mouvement de la population dans tous les pays</i> (1905); <i>Registres de population</i> (1905); <i>Gli omicidi in alcuni Stati d'Europa: Appunti di statistica comparata</i> (Homicides in some European States: Notes from comparative statistics)
Poverty and pauperism	Articles dealing with assessments of poverty and the pauper population.	13	<i>Décadence et chute des peuples</i> (1906); <i>Statistique du paupérisme</i> (1906); <i>Modèles du cadastre des pauvres à Vienne</i> (1903)
Statistical theory	Articles relating directly to the development or refinement of statistical theory and technique	51	<i>Sur les méthodes représentatives ou typologiques appliqués à la statistique</i> (1903); <i>Quelques considérations sur l'utilité d'une statistique internationale des caisses d'épargne</i> (1904); <i>Les signes caractéristiques de l'état économique, social et moral des sociétés humaines, à une époque déterminée, dans les divers pays</i> (1903);
Transportation	Articles relating to the establishments of railway, boats and other transport systems	12	<i>Mémoire de M. Vauthier sur la nécessité d'établir des bases uniformes pour la statistique internationale du trafic maritime</i> (1890); <i>Rapport sur la statistique 'transport à l'intérieur' en Russie</i> (1892)
Total		515	

The development of statistical tools to understand economic issues was important to the ISI, occupying some of the highest frequency codes. The *Economics, Finance and Property* (113) code included the largest number of articles relating to the assessment of different aspects of the economy (in the form of specific national budgets, property, taxes, income and so on). Although the format of the journal was unstandardized, there is repetition among some article titles indicating that the IIS had an ongoing discussion around a particular topic or measure. For example, this code contains an ongoing series of articles entitled “*L’évaluation de la richesse nationale*” which debated techniques for measuring national wealth. Another series of articles discussed measures for assessing international securities in a series of articles entitled, “*La statistique internationale des valeurs mobilières*”. Although likely very interesting to an economist, these discussions of technical economic measures fall outside the focus of this dissertation. In addition to economic measures of finance or property, the *Labour and workers* (51) and *Poverty and pauperism* (13) codes also included assessments of people’s (non)participation in the economy. In particular, workers’ economic living conditions, their diets, their tendency to strike, unemployment rates and the methods that could be used to establish these metrics were ongoing topics of discussion.

The IIS also held ongoing discussions about the development of statistical tools to assess different types of essential infrastructure including *Agriculture and Food* (32), *Education* (10), *Health* (24) and *Transport* (12). The debate within *Agriculture and Food* focused primarily on developing statistical measures to assess the work of fisheries and decide grain prices. *Legal theory* focused on judicial organizational structure and legal theory. *Education* focused overwhelmingly on statistical measures that could be used to understand the implementation of primary education which was being mandated during this period such as registration numbers, attendance rates and exam success rates. *Health* dealt largely with statistical studies of tuberculosis and alcoholism with some focus on mental illness, blindness, cancer and hygiene. Within *Transport*, multiple articles discuss the development of an international system to assess the size of boats and, to a lesser degree, the development of interior transportation systems, particularly the railway.

Finally, the connection between the ISI’s statistical project and older forms of counting discussed in Chapter 3 is evident in *Births, deaths and marriages* (53), a code which discusses the different metrics that can be used to assess these phenomena. *Graphical representation* (8) discusses different attempts to graphically represent statistical data. *Historical statistics* (5)

discusses attempts the IIS made to reconstruct the size of ancient populations such as the ancient Romans or Japan. Finally, *Miscellaneous* (17) includes articles whose themes were not commonly addressed such as the statistics of fires, the postal service, opinion statistics or anthropometry (the measure of the human body). The material reviewed here has implications for nation-building because it describes the goals and debates held by early statisticians as they thought about how exactly they wanted to describe and analyze the nation-state for the purposes of governance. These discussions demonstrate the social construction of statistics because they show the myriad factors – practical, social and political – that were considered when developing quantitative techniques and their interpretations.

HOW WERE STATISTICAL ORGANIZATIONS, LISTS AND METRICS MADE MEANINGFUL FOR THE STUDY OF NATIONAL POPULATIONS?

In this section, I explore my second question: how were statistical institutions, social categories and statistical metrics made meaningful for the study of national populations? I answer it by performing an analysis of the articles included in the *Statistical theory*, *Bureaucratic organization of statistics* and *National populations and international comparison* codes. Although these codes were not the highest frequency, they relate most directly to my research questions. Again, the IIS Bulletin is a wealth of information about 19th century statistical thought, and I am not able to address it all here. In this section, I begin by examining the continuities between Quetelet's epistemological vision for statistics and the ISI's epistemological ideas about the nation-state. Next, I move on to the ISI's development of bureaucratic structures for statistics and the connections they draw between statistical practice and bureaucratic organization. I then look at the ways that the IIS sought to standardize national lists and metrics to understand and compare national populations.

ANALYSIS 2.1: SOCIAL GRAVITY: QUETELET'S INFLUENCE ON THE EPISTEMOLOGICAL ASSUMPTIONS AND INSTITUTIONAL GOALS OF THE EARLY IIS

The IIS explicitly developed their statistical project around Quetelet's epistemological vision for statistics and his science: *la physique sociale*. (An influence that waned as the issues progressed.) There are specific mentions of Quetelet by name in the first sentence of the first article of the first

issue of the IIS that clearly identified him as the progenitor of their international statistical project: “*L’idée d’une organisation internationale de statistique, qui, comme tant d’autres, est due à l’illustré Quetelet*”⁹⁹ (1886, 1). Following Quetelet, the article argues that the IIS was necessary because some ‘natural facts’ about human society *are only visible through the quantitative analysis of aggregate social data* of the same phenomenon¹⁰⁰. The purpose of the IIS was to ‘reveal these facts’ through the statistical methods that they were developing. However, the use of quantitative method in and of itself is not sufficient. In order to be meaningful, according to Quetelet’s ideas, the information gathered had to be *standardized* across nation-states so that each ‘national type’ could be revealed and the general law of the *corps social* driving the formation of these national types could eventually be inferred. Neumann Spallart (1886) articulates this clearly in the first article of the first issue of the ISI:

*[D]ans l’ensemble de la société humaine, chaque peuple et chaque pays a son caractère et son type particulier, qui ne tarderait pas à disparaître en réunissant pêle-mêle en un seul faisceau les renseignements statistiques recueillis. Le type de chaque pays n’est par contre appréciable, et ne peut être exprimé en chiffres, que quand on peut le comparer avec le type d’autres pays et avec les grandes moyennes. C’est pour cette raison que nous tendons, dans la statistique internationale, non seulement à conserver la connaissance des données spéciales, mais aussi à acquérir celle de l’ensemble, et nous espérons par-là arriver aux lois les plus générales du corps social*¹⁰¹ (1886, 4).

In the founding articles of the IIS - where the organizational goals and structures are addressed - Quetelet is referenced as the progenitor of the organization’s statistical project. Neumann Spallart (1886) clearly draws on Quetelet’s idea of national types by stating that each country has its own character that can *only* be appreciated through *country-level* statistical analysis and stresses the importance of international comparability of these measures. He also directly references Quetelet’s idea of the *corps social* discussed in the previous chapter and identifies the identification of the general law of its growth as a goal of international statistics. The mere collection of numerical data in and of itself was not enough. In order to be meaningful and correspond to nature, quantitative

⁹⁹ Translation: The idea of an international statistical organization is, like many others, due to the illustrious Quetelet.

¹⁰⁰ « *Enfin il reste toujours un grand nombre de faits dont on ne peut apprécier les résultats que par de nombreuses observations embrassant le monde entier et où par conséquent la somme principale peut seule donner une solution exacte* » (Neumann Spallart, 1886, 5).

¹⁰¹ Translation: In the entirety of human society, every people and every country has its character and its particular type, which would soon disappear if we collected the statistical data haphazardly in a single bundle. Each country type can only be appreciated, and can only be expressed in numbers, when we can compare one country type with larger averages. It is for this reason that we tend, in international statistics, not only to conserve knowledge of special data, but also to acquire it as a whole, and through these techniques we hope to arrive at general laws of the social body.

data had to be collected at the level of the nation so that it could be compared with larger averages and used to find general social laws of the corps social.

The project of statistical standardization for the purpose of international comparability was therefore a central theme of many of the discussions held at the IIS and also influenced many discussions around nascent bureaucratic structure, the structure of population lists, the list categories they used to describe people and the quantitative metrics used to summarize trends. International statistics was framed by the IIS as both a scientific and political feat, “*la condition fondamentale des progrès scientifiques et administratifs*”¹⁰² (Neumann Spallart, 1886, 5). Neumann Spallart explicitly connects the ISI’s goal of standardization with the success of the metric project¹⁰³. Standardization was important because it signified that the *same* social phenomena or social category *could* be compared internationally, at least in the minds of the ISI. If different phenomena using different list categories and metrics were measured in different nation-states, there was no potential for comparison, only individual national descriptions:

Le but de la statistique est, s’il n’est pas inutile de l’établir devant une assemblée telle que celle-ci de mesurer, autant que possible, les variations de toutes les fractions du corps social, ou autrement dit, les collectivités humaines, et de mesurer également les éléments constitutifs dont elles se composent ¹⁰⁴ (Neumann-Spallart, 1888, 150).

Thus, the IIS as a statistical organization *had to be conceived* as international so that it could conform to Quetelet’s view of natural law derived from Laplace. The point was not to collect observations from one nation alone but to assemble and compare observations from as many nations as possible. These ambitions are explicitly built into the organizational statutes of the IIS (published in their second volume).

*Article 1 : L’institut international de statistique est une association internationale qui a pour but de favoriser le progrès de la statistique administrative et scientifique : 1) en recherchant et en recommandant les méthodes propres à obtenir, autant que possible, l’uniformité dans les cadres et dans le dépouillement des relevés de la statistique, afin de rendre comparables les résultats obtenus dans les différents pays*¹⁰⁵ (ISI, 1888, 1).

¹⁰² Translation: The fundamental condition of scientific and administrative progress.

¹⁰³ « *L’unification rapide des poids et mesures sur la base du système métrique doit être attribuée en partie aux résolutions motivées que les congrès n’ont cessé de faire figurer dans leur ordre du jour dès leur première session* » (1886, 8).

¹⁰⁴ Translation: The goal of statistics is, if it is not useless to establish it before an assembly such as this one, to measure, as much as possible, the variations of all the fractions of the social body, or said differently, the human collective and equally to measure the constituent elements of which it is composed.

¹⁰⁵ Translation: Article 1: The International Institute of Statistics is an international association that has for its goal the promotion of administrative and scientific statistical progress: 1) by researching and recommending the proper

This organizational statute promotes a very obvious *methodological nationalism* by making nations into different natural types that had literally been erected by natural law. The task of the diligent 19th century IIS statistician was, therefore, to develop a standardized ‘language’ (list categories and metrics) to describe these national ‘species’ so that he¹⁰⁶ could infer the natural law driving the growth of the broader *corps social*. All nations should possess the same social categories so that the results could be compared.

Although the goal of standardization may seem unremarkable, my analysis of some of the content of the IIS Bulletin demonstrates that this goal proved very difficult - both practically and theoretically - at the level of *social* detail the IIS wished to engage. Many of the ISI’s debates that I discuss in the following sections grappled with how to standardize work processes, organizational structures alongside statistical list categories and quantitative metrics in order to document national populations.

ANALYSIS 2.2: STATISTICAL BUREAUCRATIC STRUCTURE AND WORKERS

In this section, I discuss the results of the *Organization of Statistical Bureaucracy* (5) code. Although a low frequency code, the IIS did have discussions about the development of statistical bureaucratic infrastructure in various places. This is important because it demonstrates that the IIS continued Quetelet’s explicit connections discussed in Chapter 4 between the integrity of statistical data and statistical bureaucratic structures. Below, I expand on the ISI’s discussions of statistical bureaucracy, including the construction of national statistical bureaucratic networks and the profiles of statistical workers themselves.

National statistical bureaucratic networks

The IIS were interested in implementing a centralized statistical bureaucratic network like Quetelet’s Belgian Central Commission model. This model promoted a national-level central statistical institute that was intended to coordinate, compile and analyze information reported to it

methods to obtain, as much as possible, uniformity in the templates and processing of statistical records, in order to make the obtained results comparable between different countries.

¹⁰⁶ The gendered term is intentional here because the members were exclusively men during the period under examination (like many early scientific societies).

by regional bodies rather than have regional statistical bodies set their own programs of statistical study. In terms of data, a centralized structure meant more control and standardization over the categories used to analyze the population as opposed to a decentralized structure where each institution was responsible for generating its own categories of analysis as discussed in Chapter 4. The articles contained in this code tended to discuss places where statistical infrastructure was being actively implemented (Argentina and Egypt¹⁰⁷), and, in some cases, the direct result of 19th and early 20th-century colonization, alongside places where statistical infrastructure was more established (the German Empire).

The case of Egypt is particularly interesting because it directly connects statistical data integrity with statistical bureaucratic structure and colonialism. I will elaborate on this case to illustrate the connection between statistical data and statistical bureaucratic systems. In Egypt, the implementation of centralized statistical bureaucratic infrastructure was associated with the 19th and 20th -century colonial project of “progress” and “civilization”¹⁰⁸. The Director of the Egyptian Statistical Bureau reports that the statistical numbers published by his department were knowingly flawed: « *les chiffres publiés par le Bureau de la Statistique Sanitaire sur les naissances n'en reflètent pas exactement l'importance réelle* »¹⁰⁹ (1908, 8). One of the major reasons for these inaccurate numbers was described by the Egyptian Statistical Bureau as the lack of regional statistical bureaucratic infrastructure¹¹⁰.

He suggests that the reason for this discrepancy was related to legal data reporting norms and lack of organizational volition to provide data. Specifically, an 1891 law decreeing births and deaths must be reported to a *state* and not *religious* organizational authority was quite new and not regularized as social practice in 1908 (when the article was written). The state organizations responsible for reporting births and deaths were described as having either limited familiarity with

¹⁰⁷ In 1908, Egypt was an English protectorate after the 1882 Anglo-Egyptian war which had taken control of the territory from the Ottomans and, to a lesser degree, the French.

¹⁰⁸ « *Depuis 25 ans que j'ai l'honneur d'être au service de Son Altesse le Khédive, je suis témoin des efforts constants faits par son Gouvernement pour doter le pays de bureaux de statistique capables d'éclairer la marche de la nation dans la voie du progrès et la civilisation qu'elle parcourt triomphalement et sans arrêt depuis un quart de siècle... Il est vrai que le développement des recherches statistiques en Égypte n'a pas été aussi rapide que le progrès économique. Mais il n'y a à cela rien d'étonnant, car l'histoire du développement des nations nous fournit de nombreux exemples analogues* » (Randone, 1908, 7).

¹⁰⁹ Translation: the numbers published by the Bureau of Health Statistics on births does not exactly reflect their real importance

¹¹⁰ « *Quoiqu'ils n'aient pu encore réaliser le degré de perfectionnement désirable ces ouvrages contiennent néanmoins des renseignements d'une utilité incontestable. Les lacunes seraient plutôt dues à l'absence de véritables bureaux de l'état civil et d'offices sanitaires parfaitement organisés dans la province* » (Randone, 1894, 8).

this practice or were just lacking volition to furnish information to a colonial authority¹¹¹. Instead, information about births was more frequently communicated by the general public to religious organizations who had historically collected this information according to whatever religious norms they followed (there were and are many different religious groups and sects in Egypt). Like the *births, deaths and marriages* discussed in Chapter 3, this meant that there was a potential discrepancy between secular (or medical) reporting of birth and religious ones.

Statistical information about marriage was also reported to be very difficult to collect and, therefore inaccurate, for a similar reason: “*Quant au mariages, séparation et divorces, il est impossible en l’état, d’avoir des renseignements dignes du foi à leur sujet*”¹¹² (Randone, 1908, 8). Civil marriage did not exist in Egypt at the time the article was written (1908) and like the European example discussed in Chapter 3 different religious organizations controlled (or legitimated) and counted this social rite¹¹³.

The IIS hoped to implement a centralized model where a national office would direct regional offices to collect the same information so that statistical data could be accurate and consistent. This was because a centralized model meant that data collection could be standardized. The documents reviewed in this section discuss the implementation of a centralized model in various contexts. Notably, they identify various hurdles to implementation such as the need for laws to mandate the organizational reporting of certain types of data (i.e. births, deaths, marriages) as well as the challenge of active cooperation from both the regional offices and the general public to report this information. As the example of Egypt illustrates, both regional offices connected to the colonial administration, indigenous pre-colonial institutions and the general public had to willingly participate in these mundane data reporting systems for the statistical data to be valuable to the state apparatus. The documents demonstrate that their participation could not always be guaranteed, particularly in a colonial situation where other socially authoritative organizations

¹¹¹ « *Il est vrai que les Consulats envoient à l’Administration des états relatifs aux naissances enregistrées chez eux. Mais ces renseignements sont, d’une part, transmis irrégulièrement, et, de l’autres, ils sont incomplets puisqu’un très grand nombre des naissances déclarées aux autorités religieuses dans un délai qui est laissé à l’arbitraire des parents, ne sont connues par les Consulats que plusieurs mois et même plusieurs années après* » (Randone, 1908, 8).

¹¹² Translation: Regarding marriages, separations and divorces it is impossible in the current state to have information on them.

¹¹³ « *Le mariage civil en effet n’existe pas en Égypte et les Communautés et Cours religieuses, musulmanes, coptes, orthodoxes, catholiques etc. sont les seules compétentes pour célébrer les mariages, prononcer des divorces et des séparations* » (Randone, 1908, 8).

(often religious) had historically collected the and may have had less than cordial relations with the central state. Organizational structure and participation are directly connected to data quality.

Statistical workers

In addition to reflections on the organization of statistical bureaucratic infrastructure and its influence on the quality of the data collected, the articles also provide descriptions of the employment circumstances and social characteristics of the statistical workers themselves. This information provides insight into the social profile of statistical workers and provides empirical support for the observation developed in Chapters 4 that observed that as the 19th century progressed, statistical workers tended to be professionals with high social rank who were charged specifically with enumerating the human population. It also builds on the material discussed in Chapter 3 demonstrating a shift in European worker profiles towards people with higher social status and education – a trend visible largely in colonial counts before the 19th century.

The discussion of the statistical bureaucracy of the German Empire, for example, includes a detailed lists of employees including their occupational rank, employment status (i.e. full-time, part-time), educational background and income level:

Il personale dell'ufficio di statistica si compone di 12 impiegati ordinari, oltre agli impiegati che si assumono per lavori straordinari.

Il numero degli impiegati straordinari che lavorano a cottimo a domicilio, oppure in ufficio, con una retribuzione giornaliera da lire 5 a 6.25, varia secondo l'estensione dei lavori che sono da eseguirsi.

Il numero degli impiegati straordinari è salito fino ad 800 nel 1882, per lo spoglio delle schede della statistica delle professioni (Berfucszählung); attualmenet (1893) questi straordinari sono 143.

Il personale ordinario si compenava di :

1 direttore;

6 consiglieri ordinari (Mitglieder)

4 consiglieri straordinari per la parte amministrative (Ausserordentliche Mitglieder);

22 ufficiali;

5 impiegati ausiliari;

4 uscieri.

Il direttore è E. Blenck, consigliere intimo superiore di governo (Geheimer Ober-Regierungsrath), membro della Commissione centrale di statistica e del Directorium per le carte geografiche e topografiche.

Egli ha l'alloggio gratuito nel palazzo della statistica. Il suo stipendio attuale è di lire 12,375; egli riceve inoltre un'indennità speciale per la redazione della Zeitschrift.

I sei Mitglieder sono i signori: Schwietzke, consigliere superior di governo (Ober-Regierungsrath), sostituto direttore, member della Commissione central di statistica; Brämer, consigliere intimo di governo (Geheimer Regierungsrath); il dottor Petersilie, professore e segretario della Commissione central di statistica; Everi, consigliere di governo (Regierungsrath). Inoltre l'ufficio si giova della collaborazione del dottor Adolfo Wagner, consigliere intimo di governo (Geheimer Regierungsrath), professore ordinario all'Università di Berlino.

I quattro collaborator straordinari per la parte scientifica sono i signori: professore Guttstatt, dottore in medicina, docente private all'Università; dottor Francke, dottor Kluge; dottor von Woikowsky-Biedau¹¹⁴. (Anonymous, 1894,203-204)

This extract suggests that German statistical employees discussed in the above example could be grouped into two classes: a small, managerial class of twelve and a much larger casual workforce. The managerial class, made up of exclusively men, was heavily credentialed including both university professors and doctors. Their academic background ranges from geography, law and medicine – all disciplines consistent with the practice of statistics at the time. Many are affiliated with the Central Statistical Commission – a commission associated with the Imperial Statistical Office of Prussia.

Although extremely dry, this text describes a transition in the profile of statistical workers from a largely illiterate work force who did the work of counting people as part of some other job as discussed in Chapter 3 to a professional work force described by Thornwaldsen (2017) who were tasked specifically with statistical work. The professional background of the statistical working class – the people who made up the overwhelming majority of statistical workers – is not described and the only information given about them relates to the location of their work which is reported to occur both in and outside the office.

¹¹⁴ Rough translation: “The personnel of the statistical office are composed of 12 full-time staff in addition to casual workers who take on extra work. The number of casual workers who work on a piecework fashion either at home, or in the office, obtain a daily wage of 5-6.25 lire, which varies according to the work that is performed. The number of casual workers rose to 800 in 1882, due to the inclusion of statistical workers in professional labour counts; currently (1893) this casual workers are 143. The full-time staff include: 1 director; 6 full-time advisors (Mitglieder); 4 casual advisors for the administration (Ausserodentliche Mitglieder); 22 officials, 5 auxiliary employees; 4 ushers. The director is E. Blenck, head government advisor (Geheimer Ober-Regierungsrath), member of the Central Statistical Commission and of the Directorium for geographic mapping and topography. He has a free lodging in the statistical building. His current stipend is 12,375 lire; he receives a special allowance for editing the Zeitschrift. The six Mitglieder are the following gentlemen: Mr. Schwietzke, lead government advisor (Ober-Regierungsrath), deputy director, member of the Central Statistical Commission; Mr. Brämer, government liaison (Geheimer Regierungsrath); Dr. Petersilie, professor and secretary of the Central Statistical Commission; Mr. Everi, government advisor (Regierungsrath). Furthermore, the office benefits from the collaboration of Dr. Adolfo Wagner, government liaison (Geheimer Regierungsrath), professor at the University of Berlin. The four casual collaborators for the scientific program are: Professor Guttstatt, doctor of medicine, lecturer at the University; Dr. Francke and Dr. Kluge, Dr. Woikowsky-Biedau.

ANALYSIS 2.3: NATIONAL LIST AND METRIC STANDARDIZATION FOR INTERNATIONAL COMPARISON

In this section, I discuss the results of the *National Populations and International Comparison* (51) code which had one of the highest frequencies – a result one would anticipate given the ISI’s clear emphasis on international comparability as the main goal of statistics. The articles included in this code address questions such as: how can a bureaucratic administration empirically measure social category/phenomena X that is relevant for the management of the nation-state? Is the occurrence of social category/phenomena X the same across nation-states? How can the empirical measurement of social category/phenomena X be standardized across nation-states? What metrics can be used so that international comparisons are the most meaningful? All of the articles analyzed in this code were conducted at the national level and some of the articles also include a comparative element.

Although these questions may seem facile, they were some of the most pressing questions asked by the Bulletin of the IIS – and ignited ongoing discussion and debate. They were important because bureaucracies were actively developing more complex and standardized population lists such as national censuses, health statistics and educational statistics. The annual congresses were one of the primary venues used to communicate the findings from specific statistical initiatives to the broader statistical community as well as discuss strategies for standardizing specific types of statistics (labour, commercial, health, crime). The articles included in this code relied heavily on *international comparison* as part of their discussion of statistical ideas – a comparative approach connected to the ISI’s goal

*...de mesurer, autant que possible, les variations de toutes les fractions du corps social, ou autrement dit, les collectivités humaines, et de mesurer également les éléments constitutifs dont elles se composent*¹¹⁵ (Neumann-Spallart, 1888, 150).

As an example, if a Romanian statistician wished to discuss the labour statistics of Romania they would do so *in conversation with* the available labour statistics from other countries so that meaningful comparisons could be made and, presumably, a standard developed and followed – an

¹¹⁵ Translation: ...to measure, as much as possible the variations in every fraction of the social body, or otherwise said, the human collectivity and to equally measure the constitutive elements of which they are composed.

approach that very clearly illustrates Porter's insightful observation that "[n]umbers create and can be compared with norms, which are among the gentlest and yet most pervasive forms of power in modern democracies" (Porter, 1995, 45). In this section, I will examine some debates and the solutions (when possible) that the IIS generated while trying to standardize population lists and metrics so that they could be internationally comparable.

INTERNATIONALLY STANDARDIZED LISTS

As opposed to the *ad hoc* European lists discussed in Chapter 3 that tended not to use standardized categories and occasionally relied on anecdotes to describe phenomena detailed in lists, the 19th century lists discussed by the IIS increasingly used discrete, single-word categories to identify the groups and phenomena they were interested in administering. They devoted significant time and energy at the IIS conferences to standardizing list categories across nation-states (even if they did not succeed in doing so during the period surveyed). The articles included in this code are filled with ongoing debate around the question of standardization itself (i.e. *could* a given statistical category *even be* standardized across various national contexts?) as well as how to best standardize particular social categories or list types so that they could generate the most meaningful international comparisons (i.e. *when* in a bureaucratic process should the data reporting take place?). These debates are ongoing throughout the period under examination and are well-documented. For example, the Italian statistician Bodio (1890) emphasizes the ISI's ongoing struggle with international comparability of statistics when he laments: "*Les difficultés qui s'opposent à établir des parallèles entre les données des différents pays ont été le thème de longs débats en plusieurs Congrès internationaux et occupent encore aujourd'hui l'attention de notre Institut*"¹¹⁶(165i). The French statistician, Jacques Bertillon (1892), goes so far as to characterize international standardization as *the* statistical issue of his epoch¹¹⁷.

¹¹⁶ Translation: The difficulties that limit the ability to establish parallels between the data of different countries has been the subject of long debates at many international Congresses and continues to today occupy the attention of our institute.

¹¹⁷ « *C'est surtout à notre époque que la nécessité de l'uniformité dans les statistiques du travail se fait vivement sentir. L'étude de l'organisation du travail prend une place sans cesse croissante dans les préoccupations des gouvernements; plus on avance dans cette étude, plus on se convainc que pour qu'elle aboutisse à des résultats pratiques, une entente internationale est indispensable. Comment cette entente pourrait-elle être espérée, si les éléments statistiques qui en formeront la base ne sont pas comparables!* » (Bertillon, 1892, 263)

The problem of international list category standardization illustrated through the ongoing debate on criminal statistics

In this section, I use the ongoing debate on the international standardization of criminal statistics to illustrate some of the major hurdles encountered by the IIS as they attempted to standardize different sets of statistics. Generally, the ISI's goal for criminal statistics was to ensure *a common international vocabulary or nomenclature* for crime as well as to ensure that these terms related to the same social phenomena or group. The goal of criminal statistical standardization was described in the following way:

*Il faut donc s'assurer que l'homogénéité des données existe à un degré satisfaisant, au double point de vue du droit et de la technique statistique; en d'autres termes, il faut s'assurer que les même dénominations, ou les mots qu'on serait tenté de prendre comme synonymes dans les diverses langues, ne masquent pas des faits de nature différente, et que les chiffres qu'il s'agit de comparer, se rapportent aux même moments dans la marche du procès pénal, depuis la dénonciation jusqu'au jugement définitif*¹¹⁸ (Bodio, 1890, 165j).

Criminal statistics were consistently identified as a major challenge for standardization because they interfaced with both criminal legislation (reflecting socially normative constructs that were recognized by the IIS to be highly context dependent) and judicial bureaucratic organization: « *Quelles sont les bases de la statistique criminelle? La législation pénale et l'organisation judiciaire*¹¹⁹ » (Yvernes, 1890, 163). While some IIS statisticians claimed that standardization of criminal statistics was flat out impossible, others suggested that comparisons could be made if certain caveats were included. Bodio (1890) clearly articulates why these two characteristics of criminal statistics prove challenging to standardize¹²⁰.

At the level of legislation, international standardization was an issue because the criminal codes of different nation-states were different. At its most extreme, this meant that something considered a crime in one place was not a crime in another. In others, it indicated that certain crime

¹¹⁸ Translation: One must therefore ensure that the homogeneity of the data exists to satisfactory degree, from the double point of view of law and statistical techniques; in other terms, one must ensure that the same denominations, or words that we will be tempted to take as synonyms between languages, do not mask different facts of nature, and that the numbers that they allow us to compare relate to the same moments in the progress of a penal process, from the denouncement to the definitive judgement.

¹¹⁹ Translation: What are the bases of criminal statistics? Penal legislation and judicial organization.

¹²⁰ « ...je dirai que deux difficultés s'opposent aux comparaisons internationales de la statistique pénale; elles proviennent? l'une des diversités des législations, l'autre des différentes méthodes suivies pour le relèvement des données à l'origine et leur classification ou groupement, en un mot de la forme de leur publication » (Bodio, 1890, 165q)

types were grouped together differently or the relative severity and penalty for a crime was different and yet, still in others, the courts responsible for adjudicating, counting and reporting crimes were different across nation-states. Bodio (1890) illustrates this problem with a detailed discussion of the French criminal offence category of “wounds and cuts” (*“blessures et coups”*)¹²¹. Not only must accurate translations of the same criminal category be found across languages, their grouping with other crimes (if it existed) and the act to which they referred must be the same across nation states if the comparison was to be in any way meaningful. For example, Bertillon (1890) suggests that the French criminal category of *“blessures et coups”* – wounds and cuts – had accurate corollaries in the German and Italian criminal codes – both with reference to the *translated term* used and the *type/severity* of action to which it referred. He claims that this criminal category does not find a similar corollary in the English criminal system which lumps ‘wounds and cuts’ together with a series of other acts of physical violence that are much more severe in scope. He suggests that equating the French (*“blessures et coups”*), Italian (*“Lesiones”*) and German (*“Körperverletzungen”*, *“Körperliche Beschädigungen”*) with the English *“Shooting and Wounding”* would not be meaningful because the English category referred to a much broader and more severe spectrum of physical violence¹²².

The issue around classification is further compounded by different potential crime categorizations or groupings at different judicial stages and levels of court¹²³. Further, the level of

¹²¹ « Un autre exemple des méprises auxquelles pourrait être entraîné un esprit superficiel dans les comparaisons internationales est fourni par le groupe des blessures et coups, tels qu’il est conçu par la loi anglaise, vis-à-vis des Codes pénaux des autres États de l’Europe. On ne rencontre pas dans le droit anglais de délit qui corresponde exactement aux *“blessures et coups”*, des Codes italien et français et des *“Körperverletzungen”*, *“Körperliche Beschädigungen”*, *“Lesiones”*, etc., d’autres Codes européens. La loi anglaise distingue, à un autre point de vue, les *Shooting et Wounding* (délits plus ou moins graves) de l’ensemble des autres infractions du même genre, qu’elle nomme *Assaults* et parmi lesquelles elle comprend aussi les injures, menaces, outrages et rébellions peu graves contre les agents de la force publique, et en général toute espèce d’offenses contre les personnes, dont il est résulté, ou aurait pu résulter, un dommage corporel. Il est évident que la notion de l’*Assault* est plus étendue que celle de nos blessures et coups, et qu’une comparaison entre ces deux groupes ne saurait être établie » (Bodio, 1890, 165).

¹²² « L’autre des différentes méthodes suivies pour le relèvement des données à l’origine et leur classification ou groupement, en un mot de la forme de leur publication ».

¹²³ « Ajoutez que la plupart des statistiques, même quand elles distinguent toutes les espèces de délits, ne poursuivent pas toutes ces distinctions objectives à travers toutes les magistratures; de sorte que, par exemple, on connaîtra le nombre des vols qualifiés portés au jugement de la Cour d’assises et on n’aura pas les vols qualifiés séparés de l’ensemble des vols pour les affaires portées, en raison de compétence pour la gravité moindre, devant les Tribunaux correctionnels; on connaîtra le nombre des vols simples, jugés par les Tribunaux et on n’aura pas le nombre des vols simples portés devant les Prêteurs, parce que ces derniers seront compris parmi les délits contre la propriété, sans autre distinction. Un pareil inconvénient a existé jusqu’à 1886 dans la statistique italienne; mais on y a remédié, de sorte que pour les dernières années nous avons la totalité des vols qualifiés et le total des vols pour les trois magistratures » (Bertillon, 1892, 165L).

detail used to describe a crime is also noted to vary depending on national context¹²⁴. The IIS considered *the way crimes are grouped together* by different legal systems, *when* a given nation-state chose to publicly report and count a crime during the judicial process and the *level of specificity* used to describe the criminal process as limiting constraints in the international standardization and comparability of social data.

With meaningful international comparability as the goal, the hurdles to successful statistical standardization were monumental - dealing not just with organizational structure but organizational process, legal codes and language. The IIS considered the social and institutional processes behind the construction of categories very literally and in very high levels of detail because they saw them as integral to the quality of the data they were generating and analysis they could furnish. The ISI's data problems were social – related to national institution building - not mathematical.

The solution to international list standardization illustrated through the example of census labour statistics

While the ISI's discussions around criminal statistics are useful for understanding the challenges they encountered when trying to internationalize their statistical project and the level of social detail they considered, they did not appear to satisfactorily resolve their approach to criminal statistics during the period under study. The IIS' conversations around the standardization of the national census suggest some of the ways that the IIS attempted to solve their standardization problems. In this section, I will discuss how national census labour categories were internationally standardized by the ISI.

As Chapter 4 discussed, Quetelet's 1829 census of Belgium is considered to be the first modern national census (Vanderstraeten and Louckx, 2020; Curtis, 2001; Thornwaldsen, 2017). One of the major projects of the IIS - that began early on in 1895 and continued throughout the period of study - was the project of internationally standardizing the national censuses of all IIS members. Again, this was because in the ISI's view (during this period), the true value of statistics

¹²⁴ « ...nous trouvons que les statistiques livrées au public diffèrent beaucoup entre elles au point de vue de l'abondance des détails. Les statistiques française et italienne entrent dans tous les méandres du procès pénal, tandis que celle de l'Autriche, par exemple, se borne à considérer la criminalité au moment du jugement définitif de condamnation ou d'acquiescement » (Bertillon, 1892, 165L).

was largely in its potential for *international* comparison so that they would be able to establish their state of equilibrium of each nation (and politically intervene, if necessary) and, ultimately, find the natural law driving the growth of the corps social allowing them to predict future events. They wanted to extend their census project worldwide and develop a global census that would encompass all humanity – an ambition for global statistical hegemony that they explicitly built into their census form templates (see Appendix 2). A resolution from 1898 confirms the importance the IIS attributed to the national census project:

*L'Institut international de statistique exprime le vœu urgent qu'au commencement du XXe siècle puisse avoir lieu dans tous les pays civilisés de la terre, et autant que possible le 31 décembre 1900, un recensement basé sur des principes uniformes et dépouillé d'une façon uniforme d'après les points de vue ci-après*¹²⁵ (ISI, 1898, 203).

The IIS returned frequently to the question of the national census at their annual congresses, debating specific list categories or census questions based on the experience of their members and adopting resolutions that attempted to remedy any issues. Early in the ISI's history, in 1898, they adopted a resolution regarding the list categories they believed all national censuses should possess¹²⁶. The social characteristics that the IIS deemed meaningful for understanding the nation-state included items such as name, sex, age, family relation, civil status, professions, religion, language, literacy and location of birth/nationality. Although these categories appear self-evident, the ISI's initial attempts to apply them proved difficult to operationalize and additional IIS resolutions were introduced to further clarify them. Specifications were introduced including new category breakdowns as well as more detailed instructions regarding category analysis:

Renseignements individuels: 3) Effectif et d'état d'agglomération de la population: Classification des communes ou autres unités administratives, d'après les classes

¹²⁵ Translation: The International Institute of Statistics articulates the urgent wish that at the beginning of the XX century all civilized countries, ideally on December 31, 1900, will have a census based on uniform principles and stripped of a uniform manner from the perspective of the following viewpoints.

¹²⁶ « Les recensements doivent se rapporter à la population de fait. Les questions à poser à chaque individu sont: a) les noms et prénoms; b) le sexe; c) l'âge (si possible en indiquant l'année et le mois de la naissance; en cas contraire, en années révolues et, pour les enfants au-dessous d'un an, en mois révolus); d) le rapport au chef de la famille ou du ménage (degré de parenté ou condition dans le ménage); e) l'état-civil (non-marié, marié, divorcé, veuf); f) la profession ou condition (profession principale, en indiquant les professions secondaires). Indiquer si l'individu est patron, aide ou ouvrier; pour les personnes qui vivent dans une famille sans avoir elles-mêmes une profession distincte, faire mention de la profession qu'exerce le chef de famille; g) le culte; h) la langue parlée ou maternelle; i) la connaissance de la lecture et de l'écriture; j) le lieu de naissance et la nationalité politique. On indique, si c'est possible, la commune, ou tout au moins la plus grande division territoriale dans laquelle se trouve le lieu de naissance de la personne recensée (comté, canton, gouvernement, province, département, Regierungsbezirk, etc.) » (ISI, 1898, 203-204).

suivantes: nombre des communes jusqu'à 500 habitants - de 501 à 1000 habitants - de 1001 à 2000 - de 2001 à 5000 - de 5001 à 10,000 - de 10,0001 à 20,000 - de 20,001 à 50,000 - de 50,001 à 100,000 - de 100,001 à 200,000 - de 200,001 à 300,000 - de 300,001 à 400,000 - de 400,001 à 500,000 - au-dessus de 500,00 habitants. (Il est désirable que l'on donne l'énumération des centres de population agglomérée qui se composent de plusieurs communes); 4) La distinction des sexes doit entrer dans toutes les combinaisons du dépouillement en ce qui regarde la population; 5) L'âge doit être dépouillé par périodes annuelles d'âge. (Il est désirable que l'on donne dans le tableau qui comprend les périodes annuelles d'âge une récapitulation par groupes quinquennaux); 6) L'état civil doit être dépouillé par périodes annuelles d'âge. (Il est désirable que l'on donne dans le tableau qui comprend les périodes annuelles d'âge une récapitulation par groupes quinquennaux); 6) L'état civil doit être dépouillé au moins d'après les catégories suivantes: célibataires - mariés (y compris les séparés) - veufs - divorcés; L'état civil doit être combiné avec l'âge d'après les divisions suivantes: 0 à 15 ans, 15 à 20 ans et ainsi de suite - par groupes quinquennaux d'âge; 7-8) Religions et nationalités: a) Toutes les dénominations inscrites dans les bulletins devront être reproduites dans les modèles de dépouillement; b) pour les religions et nationalités principales et plus précisément pour celles qui surpassent le nombre de 10,000 individus, on admettra les combinaisons suivantes: a) âge par périodes décennales b) nombre total des personnes ne sachant ni lire ni écrire au-dessus de 15 ans; c) religions principales par nationalités principales; 9) Lieu de naissance: le dépouillement sera fait séparément pour chacun des États indiqués; 10) Nombre des personnes ne sachant ni lire ni écrire pour la population totales au-dessus de 15 ans; 11) La statistique de la population par étages des maisons habités (voir la résolution no.1) et par âge (selon des groupes quinquennaux - voir la résolution no. 5) sera faite d'après les groupes suivants: a) campagne (centres jusqu'à 2000 habitants); b) villes (de 2001 à 100,000 habitants); c) grandes villes (au-dessus de 100,000 habitants); 12) Infirmité, c'est-à-dire statistique des aveugles, des sourds-muets, des aliénés et des idiots. On indiquera: a) le nombre des personnes vivant dans les familles ou dans les établissements; b) les infirmités au moins pour les combinaisons suivantes: nombres des aveugles qui sont en même temps ou sourds, ou muets, ou aliénés, ou idiots, nombre des sourds-muets qui sont en même temps ou idiots, ou aliénés; c) l'état civil d'après les quatre catégories; d) les religions principales; e) les nationalités principales; f) l'âge par périodes annuelles¹²⁷ (ISI, 1924, 9).

¹²⁷ Translation: Individual information : 3) Number and state of the population : Classification of municipalities or other administrative units, according to the following classes: number of municipalities up to 500 inhabitants; from 501 to 1000 inhabitants- from 1001 to 2000 – from 2001 to 5000- from 5001 to 10,000 – from 10,001 to 20,000 – from 20,001 to 50,000 – from 50,001 to 100,000 – from 100,001 to 200,000 – from 201,000 to 300,000 – from 300,001 to 400,000 – from 400,001 to 500,000 – above 500000 inhabitants. (It is desirable that we give a list of agglomeration population centres which are made up of several municipalities; 4) The distinction between sexes has to enter into all combinations of counting with regard to the population; 5) Age must be counted by annual periods. (A table that includes annual age periods articulated in five-year groups.); 6) Civil status must be counted at a minimal according to the following categories: single – married (including separated) – widowed – divorced; Civil status should be combined with age using the following divisions: 0 to 15 years, 15-20 years and also by five year age groups; 7-8) Religions and nationality: a) All denominations written in the ballots should be reproduced in the counting models; b) for principal religions and nationalities and more specifically those that surpass 10,000 individuals, we will use the following combinations: a) age by decennial period; b) total number of people that do not know how to read or write above the age of 15 years; c) principal religion by principal nationality; 9) Place of birth: the counting of this should

Through these specifications and the debates that led to them, it is possible to see how some census categories were modified over time and, in some cases, the rationales for their modification. The ISI's ongoing debate over how to construct the labour categories of the national census is a particularly useful example of one of the ways that the IIS attempted to resolve the problem of international list category standardization.

Solution to list category standardization: Hierarchical nomenclature

Like the criminal statistics discussed above, the labour portion of the national census also possessed regional differences in terms of the categories, organizational structures and specific terms used to describe labour that the IIS identified as obstacles to standardization in their discussions¹²⁸. They resolved these issues through a long inquiry into existing labour nomenclatures in a multi-year initiative headed by Jacques Bertillon – a very internationally renowned statistician of his day - of the French statistical department that began in 1881. Based on a review of existing national labour nomenclatures from twenty IIS member states - but particularly influenced by the German labour model which was considered to be the most advanced of any IIS member at the time - Bertillon formulated an organizational approach that he believed was versatile enough to birth a universal labour nomenclature (Bertillon, 1891, 275). Bertillon's solution to the problem of international standardization was to construct *hierarchical nomenclatures* of labour¹²⁹, like those found in biology, with different classificatory schemes that

be done separately by each State; 10) Number of person who do not know how to read or write above 15 years; 11) Population statistics by house floors occupied (see resolution number 1) and by age (using five year groups – see resolution number 5) will be done according to the following groupings: a) country (centres with populations up to 2000 inhabitants); cities (from 2001 to 100,000 inhabitants); c) large cities (over 100,000 inhabitants); 12) Infirmary, that is to say statistics of the blind, the deaf, the mentally unwell and idiots. We indicate: a) the number of people living in families or in establishments; b) the infirmities in the following combinations (at least) : number of blind people who are also deaf, or mute, or mentally unwell, the number of deaf-mutes who are at the same time idiots or mentally unwell; c) civil status according to the four categories; d) principle religions; e) principal nationalities; f) age by annual period.

¹²⁸ « Mais un grand nombre de nos collègues ont émis des doutes sur le succès de nos efforts. “Dans chaque pays, disent-ils, il existe déjà une nomenclature des professions. Or, chaque pays préférera conserver sa nomenclature passée afin de pouvoir comparer le présent avec le passé, plutôt que d'en adopter une nouvelle, quoique celle-ci lui permette, à vrai dire, une comparaison avec l'étranger » (Bertillon, 1898, 228).

¹²⁹ « Si nous vous avions présenté une seule nomenclature, nous n'aurions pas été suivis par les pays qui auraient trouvé cette nomenclature trop longue, ni par ceux qui l'auraient trouvée trop courte. Nous échappons à cet inconvénient en vous en présentant trois qui rentrent en quelque sorte l'une dans l'autre, puisque l'une n'est que le

moved from a very general nomenclature with very few categories to increasingly specific nomenclatures with significantly more list categories. The main idea was that each level of nomenclature would encompass another so that nation-states could contribute information at any level of specificity and analysis could be done at the highest level of generality in order to ensure international comparability.

Bertillon's scheme included six different levels of classification that moved from the general industry of employment to the specific profession of each worker. At the highest level of generality, he built four large 'labour families' into his first nomenclature: A) *Production de la matière première* (including 1. Exploitation de la superficie du sol and II. Extraction de matières minérales) ; B) *Transformation et emploi de la matière première* (including III. Industrie, IV. Transport, V. Commerce); C) *Administrations publiques et professions libérales* (VI. Force publique, VII. Administration publique, VIII. Professions libérales, IX. Personnes vivant principalement de leurs revenus); D) *Divers* (X. Travail domestique, XI. Désignations générales sans indication d'une profession déterminée and XII. Improductifs – Profession inconnue) (See Appendix 3).

In addition to the *field of labour* in which a person could work (industry and specific profession), the IIS also developed a classification for distinguishing between the *employment conditions* as well as the *sex* of the workers in any given field of labour: a tripartite labour classification scheme. The major organizing principle they used to develop the *employment conditions* was self-employed versus employed by someone else¹³⁰. The idea was that a self-employed person would be characterized by their profession while an employed person would belong to the same industry as their employer. From this principle, they generated their general

développement de l'autre ... La première de nos nomenclatures ne compte que 61 rubriques. La seconde reproduit quelques-unes de ces rubriques générales et en développe un grand nombre d'autres; elle compte 207 rubriques. Enfin, la troisième reproduit un certain nombre des rubriques de la seconde nomenclature et en développe beaucoup d'autres. Elle compte 500 rubriques...L'important est que le cadre général soit toujours celui de la 1^{re} nomenclature (la plus sommaire des trois) et que les professions y soient rangées conformément aux indications de la 3^e nomenclature (la plus détaillée des trois) » (1898, 1227).

¹³⁰ « Dans un grand nombre de pays, on distingue au moins deux catégories d'individus dans chaque profession, à savoir : 1) **ceux qui travaillent à leur propre compte**; 2) **ceux qui travaillent au compte d'autrui**. Cette distinction est très importante. On peut, à l'exemple de l'Allemagne, aller plus loin dans cette voie et faire deux distinctions dans chacune de ces deux catégories. Parmi ceux qui travaillent à leur compte on peut distinguer a) les patrons proprement dits et b) les sous-patrons, marchandeurs et autres, c'est-à-dire des individus à qui l'entrepreneur fournit des matières premières ou des capitaux et qui se font sous-entrepreneurs, engagement des ouvriers et les font travailler. Parmi ceux qui travaillent au compte d'autrui, on peut distinguer a) les employés et b) les ouvriers » (Bertillon, 1892, 275).

nomenclature for defining employment conditions: Employers (*patrons*), employees (*employés*), workers (*ouvriers*) and families (*familles*).

I. — *En ce qui concerne l'industrie et le commerce.*

PATRONS. — Le mot patron doit être pris dans son sens le plus large. Quiconque fait travailler à son compte est un patron. Ainsi un marchandeur, un chef d'atelier faisant travailler à son compte doivent être classés dans la colonne des patrons.

EMPLOYÉS. — Un comptable, un caissier, un courtier, un voyageur de commerce, un représentant de commerce, un placier sont, sauf indications contraires, classés dans la colonne employés même lorsque des rubriques spéciales leur sont destinées.

OUVRIERS. — Un contremaître, un chef d'atelier faisant travailler pour le compte d'un patron, doivent être classés dans la colonne ouvriers.

FAMILLE. — Une femme, un enfant ayant une profession distincte de celle du chef de famille, doivent être classés à leurs professions respectives, et ne doivent pas être classés dans la colonne famille en regard de la profession du chef de famille. Il en sera ainsi même si la profession exercée par cette femme ou par cet enfant est peu lucrative et insuffisante à les faire vivre.

Une femme qui se dira *ménagère* sera classée dans la colonne famille en regard de la profession exercée par le chef de famille.

Figure 12: Definition of employers, employees, workers and family¹³¹ (ISI, 1898, p.231)

There are a number of implicit assumptions evident in the employment conditions sub-categories that are likely reflective of a 19th century factory model of employment. The most obvious being the implicit assumption that someone who was self-employed would be the owner of an industry that employs other people. Another notable feature of this division relates to the inclusion of non-working family members, explicitly assumed to be *non-working* or *underpaid* women and children¹³², as well as women who described their *remunerated profession* as housekeepers

¹³¹ Translation: 'Patrons': The word patrons should be taken in its larger sense. Whoever makes others work on their behalf is a patron. Also a bargainer, an office chief who make others work on their behalf should be classified as patrons. Employees: An accountant, a cashier, a courtier, a commercial traveller, a commercial representative, an agent are, without other indications, classified in the employee column because a special rubric is destined for them. Workers: A foreman, an office chef who does work on the behalf of a patron, should be classified in the worker column. Family: A woman, a child with a distinct profession from that of the head of the family, who can be classified according to their own respective profession and should not be classified in the family column with regard to the profession of the head of family. It could also be that the procession of the woman or child is not lucrative or insufficient to live. A femme who calls herself a clear will be classified in the family column with regard to the profession of the head of the family.

¹³² Child labour was common during this period. As Chapter 4 discussed, mandatory *primary* schooling was either very new (as an example mandatory primary schooling was mandated in 1882 in France) or not present in many IIS member nations.

(“*ménagères*”). There was a dual rationale¹³³ for this choice that reflects the social and historical circumstances of the list’s emergence. First, it replicated the German statistical standard that the IIS hoped to emulate. Second, it enabled the IIS to establish the ratio between the worker (implicitly characterized as a male) and the number of unremunerated or underpaid family members (explicitly characterized as unremunerated women and children or remunerated women with a husband who described themselves as housekeepers) who “weighed on the other three categories of people”.

Regarding the third labour classification of sex, there was little IIS debate over the breakdown of the sex category: « *Il est évident que pour chaque profession il faut distinguer le sexe de ceux qui l'exercent. Il n'est pas de pays, du reste, qui ne fasse cette distinction*¹³⁴ » (Bertillon, 1892, 275). It bears noting that the division of labour statistics by sex was common practice during the period and that the IIS did not appear to recognize the implicitly gendered quality of the second *employment conditions* nomenclature.

Domestic misfits

In order for their tripartite (*industry/profession*, *employment condition* and *sex*) labour nomenclature to work, the IIS devoted time at their Congresses to discussing the perceived accuracy of these three nomenclatures by applying them to different well-known professions. Their ambition was to ensure that the general categorical principles for each nomenclature generated mutually exclusive results. Amongst the professions used to ‘trial’ their tripartite labour nomenclature, the IIS dedicated considerable time to discussing the example of *domestic workers* (or, during this period, servants). This was because domestic workers – a numerous group known to IIS members for which they had to account – effectively confounded every organizing principle

¹³³ « Pour chacune des 8 catégories dont nous venons de parler, l'Allemagne fait connaître le nombre des membres de la famille sans profession propre (en séparant ceux de moins de 14 ans et ceux de 14 ans) et les domestiques attachés à la personne (*Angehörige ohne Erwerbstätigkeit im Hauptberuf*). Déjà, en 1866, le recensement français avait relevé ces utiles renseignements et les recensements suivants en ont relevé une partie. En Angleterre, ces distinctions ne sont pas faites. Les membres de la famille sans profession sont comptés à la rubrique sans profession. **Il nous semble assez important de rattacher à la profession considérée tous ceux qu'elle fait vivre indirectement, surtout si l'on distingue la famille des patrons de la famille des employés et de la famille des ouvriers.** De cette façon, on fera connaître l'étendue des charges de famille qui pèsent sur ces trois catégories de personnes » (ISI, 1892, 276).

¹³⁴ Translation: It is evident that for each profession one must distinguish the sex of the person performing it. Moreover, there is no country that does not make this distinction.

the IIS had developed for their tripartite labour nomenclature. First, domestic workers were anecdotally understood to perform such a diversity of work tasks (i.e. cooking, cleaning, home repair, animal husbandry, transportation, etc.) that they could be grouped into multiple major industries (the highest level of the hierarchy) and professions (the lowest level of the hierarchy) due to the extremely broad scope of their work activities. This raised the question of how domestics should be categorized at different hierarchical levels of nomenclature. Specifically, the IIS debated whether there *should* there be a “domestic” category at the lowest level of the labour nomenclature initiating discussions of how different levels of the labour hierarchy related to one another. Second, domestic workers were anecdotally known to have multiple employers, confusing the assumptions behind the *self-employed* (the boss of industry who employs multiple people) and *employed* (an employee or worker employed by the *patron* or the women and children associated with one of these workers) organizing principle of the ISI’s second labour classification scheme (employment conditions). Finally, the acts of domestic work or the work done to maintain a household could be performed by an unremunerated family member who was explicitly assumed to be a woman by the ISI, a remunerated domestic worker (sex not considered) or by someone who was sometimes remunerated and sometimes not confounding the assumptions about sex that the IIS had built into their classification scheme. As a reminder, the IIS had decided that married women who identified themselves as doing remunerated housekeeping work (“*ménagères*”) should *not* be counted as workers but as family members.

Domestic workers sat awkwardly at the intersection of two axes of the ISI’s labour nomenclature and the IIS Bulletin documents an ongoing debate regarding what exactly should be done with them. The initial classification for domestic workers developed by Bertillon in 1892 reflects the ISI’s collective bewilderment. Placed under the “*Divers*” (“Other”) Industry (the most general level of the nomenclature), the official description bluntly reads: “*X. Divers – Nous y rangeons les domestiques (que nous ne saurions placer dans aucune des autres classes professionnelles) les individus improductifs et enfin les individus dont la profession est restée inconnue* » (Bertillon, 1892, 274). Literally, “here we include domestic workers (because we could not put them in any other professional category)” – a definition reflecting not the substance of domestic workers’ labour but rather their total lack of conformity with the ISI’s classificatory principles.

There were differing views on how to make domestic workers ‘fit’ within the ISI’s tripartite labour classification that ranged from eliminating the domestic worker category completely to including them in other labour categories to modifying the way that family members were reported. Much of the debate focused around attempting to define what the substance of domestic work was and why that was different from other professions and employment conditions. Some IIS statisticians argued that the inclusion of domestics in the professional category of the labour census was not productive and would create conceptual confusion with the “auxiliary” or “assistant” labour category, skewing census results¹³⁵. In this view, domestic workers need not be accounted for with their own professional category because they were actually ‘auxiliaries’ or assistants for different professions. (“skill” vs sector)

Other statisticians disagreed, suggesting that the multiple labour tasks and multiple potential employers of domestic workers meant that they should be accounted for in a separate professional category. They could not be counted as family members and should be categorized as self-employed¹³⁶. Over the course of the period surveyed (1888-1912), the IIS resolved their dispute over domestic labour by retaining domestic work within the Other category and adopting a five-part domestic work disaggregation that included entries for family (again gendered as married women) in addition to a number of other specific domestic roles (ex: concierges, gardeners, cooks, coachmen, etc.).

¹³⁵ « M. Rubin croit absolument indispensable de faire entrer la domesticité dans la décompte des différents métiers: il y a déjà à cela une forte bonne raison, c’est qu’il arrive fréquemment qu’on ne sait pas jusqu’à quel point une personne comptée comme domestique n’est pas plutôt un auxiliaire, attaché à la profession cas qui se présente non seulement dans l’agriculture, mais aussi dans plusieurs métiers industriels comme dans la boulangerie, dans certains métiers opératifs comme transports par chevaux. Compter les domestiques dans une classe à part, c’est causer un détriment à la statistique de ces industries » (ISI, 1900, 57).

¹³⁶ « La service domestique est un emploi indépendant directement rémunéré qui ne dépendant nullement de l’occupation du patron et susceptible d’être transféré à volonté d’une famille à une autre. Il n’est pas d’une grande importance pour la statistique de connaître le nombre des domestiques attachés à chaque profession tandis que le chiffre total de cette classe est un fait d’importance considérable » (Baines, 1900, 55-56).

X — TRAVAIL DOMESTIQUE (A).

56. Travail domestique . . .	192. Membres de la famille (femmes mariées, etc.) adonnés aux travaux domestiques (B).	177. Membres de la famille (femmes mariées, etc.) adonnés aux travaux domestiques.
	193. Concierges, gardiens de magasin, de chantier, etc.	478. Concierges, gardiens de magasin, de chantier, etc.
	194. Cuisiniers et cuisinières	479. Cuisiniers et cuisinières.
	195. Cochers et palefreniers	480. Cochers et palefreniers.
	196. Autres domestiques	481. Autres domestiques.
		482. Femmes de ménage.

Figure 13: The ISI's 1895 resolution to the question of domestic work in the national census

The point of drawing attention to these discussions is *not*, as Bowker and Star (2015) note, to “unmask a false pretender to the crown of science” (71) or to ridicule the inaccuracies and technical limitations of an obviously outdated form of scientific practice¹³⁷. The point is “draw attention to an explicit, positive and practical feature” (Bowker and Star, 2015, 71) of list making as a technique and to incorporate *the processes that the IIS used to develop and accept labour categories generated to empirically understand the nation-state into our understanding of the labour categories themselves*.

This means that although the classificatory principles that the IIS developed were intended (and likely believed by IIS members) to simply ‘reflect’ the nation, the IIS transcripts of the debate on domestic work demonstrate that this list category is better understood as what Bowker and Star (2015) term a “negotiated order” (34), the result of “the shifting ecology of relationships among the disciplines using the classification” (Bowker and Star, 2015, 70). The domestic work category of the national census discussed in this chapter was as much about *what* or, in this case, *who-is-in-social-reality* as about *the way the IIS wanted their classification systems to work for the purposes of quantitative analysis of the nation-state using probability theory and how the group under question was understood by an elite group of scientists*. These debates, that ironically use theoretical methods to establish empirical statistical research norms, vividly illustrate the central

¹³⁷ Again, this dissertation is based on an analysis of discussions held between a specific time-period (1888-1912). Although there are clearly issues with the way that the IIS went about doing their analysis because they do not conform to current social scientific norms, I have included the resolution to demonstrate a point about the technical process that the IIS used to develop their statistical nomenclatures. I want to stress that these resolutions are temporally bound and not reflective of IIS practice today. The ISI’s approaches to labour nomenclature very likely changed significantly between 1912 – 2024. I have not evaluated them in this chapter.

argument of this chapter: the nation-state is constructed through the techniques used to evidence it (Curtis, 2002; Desrosières 2008a; 2008b).

The imaginary carpenter in the imaginary porcelain factory

In addition to disputes about the conformity of individual categories with their organizing principles of nomenclature, the IIS also ‘tested’ the feasibility of their labour nomenclatures so that they could ensure that they conformed to the empirical reality that they wished to capture. The great irony was that although the nomenclatures they were developing were intended to conduct empirical research to tell social scientists ‘what-authoritatively-and-scientifically-existed-in-social-reality’, one of the techniques the IIS used to refine and ‘test’ the viability of their labour nomenclatures was the thought experiment, an imaginary scenario derived (presumably) from the collective lived experience of the people in the room (all men, etc.) - a process that is clearly documented in the IIS transcripts. This is interesting from an STS perspective because it demonstrates that the tools for doing-statistical-empirical-research to authoritatively-tell-us-what-is-there-in-social-reality were *not* empirically ‘reflective’ of what-was-going-on-in-social-reality at their inception. The IIS members were not systematically *in* factories or different workplaces talking to different types of workers about how they understood their professions, observing different types of work relations (although they may have been commenting on observations they had heard from workers) to ensure that their nomenclatures reflected what-was-going-on-in-social-reality.

One of the thought experiments that the IIS returned to frequently in their discussions on the labour nomenclature of the international census was the example of a carpenter working in a porcelain factory:

*Il avait été entendu à Vienne qu'un ouvrier devait être classé selon sa profession, et non pas selon celle de son patron, et que par exemple un menuisier, employé dans une fabrique de porcelaines à confectionner les caisses dans lesquelles la marchandise doit être emballée, sera compté comme menuisier et non comme céramiste*¹³⁸ (ISI, 1898, 229).

Effectively, if a carpenter was working in porcelain factory constructing the wooden boxes that would be used to ship the porcelain, should said carpenter be classified as a *carpenter* according

¹³⁸ Translation: In Vienna, a worker should be classified according to their profession and not by that of the patron, such that a carpenter, employed in the development of porcelain who makes boxes for the merchandise should be understood as a carpenter and not a ceramicist.

to their profession or as a *porcelain factory worker* according to their relation to the employer and the industry of their production? This imaginary scenario was used to debate and test the relation between the classificatory principles of *industry/profession* and *employment conditions*. The first question concerned the relation between different hierarchical levels of the labour nomenclature or labour families. How should a profession – the lowest level of the nomenclature – relate to industry – the highest level of the nomenclature? The second question concerned professional classification based on employment relation. *Should* the industry of an employed worker be defined by the industry of their employer or by the profession of the worker?

There were different opinions regarding how this person should be characterized and, by extension, if the carpenter in the porcelain factory should be characterized as a *carpenter* or a *porcelain worker*. Some statisticians (in this case, the Norwegian statistician Anders Nicolai Kiaer who incidentally was the first person to develop an approach to population sampling) suggested that the carpenter should be classified as a *porcelain factory worker* because of their relationship to the employer¹³⁹. Effectively, this was because the porcelain factory is the outcome of the labour collaboration of all the workers whose main vocational goal is to produce porcelain. Further, the workers are all dependent on the same employer for payment. If the porcelain factory closes, all the workers will lose their employment. The carpenter is a porcelain factory worker.

On the other side, other statisticians (in this case, Jacques Bertillon) suggested if the labourers were classified according to the industry in which they were working (the carpenter as a porcelain factory worker), then the specificity of the category of profession would be lost completely¹⁴⁰. This suggestion elicited discussions around the *meaning* and *relation* of the ordering principles of their labour nomenclature. Instead of asking ‘*which category best reflects social*

¹³⁹ « [M. Kiaer] fait remarquer notamment que ‘tous les ouvriers d’une même industrie concourent par leur coopération au même but et qu’ils appartiennent, pour ainsi dire, à la même famille économique’. ‘Si l’entreprise à laquelle ils sont attachés ne réussit pas, et doit se liquider, ils perdent tous immédiatement leur emploi. Dans l’exemple cité page 275 de notre Bulletin, savoir celui d’un menuisier employé dans un fabrique de porcelaine, je le classerais comme ouvrier de fabrique de porcelaine, et non pas comme menuisier, à condition toutefois qu’il soit engagé par la fabrique de la même manière que les autres ouvriers. Mais je ne considérerais pas comme tel un menuisier travaillant pour la fabrique de porcelaine, quand bien même ce travail serait très constant, s’il n’était pas engagé de cette manière’ » (ISI, 1898, p. 229)

¹⁴⁰ « On pourrait peut-être objecter à M. Kiaer que dans ce dernier cas, ce menuisier « concourrait au même but » que les ouvriers de la fabrique; que dans ce cas aussi « il appartiendrait à la même famille économique » et que si la fabrique venait à se liquider « il perdrait immédiatement son emploi ». En sorte que, de proche en proche, on serait amené à rattacher toute une région à une même industrie. Assurément, il serait très intéressant de connaître, comme le demande M. Kiaer, le nombre d’individus attachés à un titre quelconque à chaque industrie. Mais il n’est pas moins intéressant de connaître la profession propre des habitants d’un pays » (ISI, 1898, 230).

reality?’, they are asking ‘*what vision of social reality could our nomenclature elicit? Whose perspective should any given labour category reflect?*’. Bertillon – the leader of this labour nomenclature project - resolves¹⁴¹ the issue of the imaginary carpenter with a thought experiment. The imaginary carpenter should be counted as a carpenter because he¹⁴² would never define himself otherwise and would go to great lengths to evade authorities who asked him for supplementary information about his employment conditions. The agency of the imaginary carpenter and his suspected lack of volition to provide meaningful data¹⁴³ about himself to an authority figure alongside Bertillon’s status as the leader of the labour nomenclature project is what decides the issue. The carpenter is a carpenter and not a porcelain factory worker.

This example shows that although the ISI’s classificatory principles were intended to be generally applicable, their application *even in the labour contexts for which they were intended* (like carpenters in a porcelain factory) did not make intuitive sense to all members of the IIS because they did not understand how different levels of the hierarchical nomenclature should relate to each other (i.e. should a worker be categorized by the industry in which they work/employer or their stated profession?). Further, the way that the IIS resolved these conundrums is also notable because it used a theoretical method of knowing (the thought experiments) to resolve an empirical question (what labourers exist in the nation-state).

Summary: The ISI’s problems of standardization and its solutions

The standardization of list-categories across nation-states for the purposes of international comparability was one of the major goals of the IIS during this period. Although this task may seem straightforward, it appeared quite challenging largely due to the level of social detail the IIS considered in their examination of statistical data. In this section, I use the ISI’s debate on criminal

¹⁴¹ «Entre ces deux recherches différentes, il faut choisir. Or, c’est cette dernière que la pratique nous impose. **En effet le menuisier employé dans une fabrique de porcelaine ne se déclarera jamais céramiste, car il ne l’est pas; il se déclarera « menuisier », et dans la majorité des cas il négligera (quelque précaution que l’on prenne) d’ajouter qu’il est employé régulièrement dans une fabrique de porcelaine.** Comptons donc comme « menuisier » puisque nous ne pouvons faire autrement. La résignation nous sera d’autant plus facile, que ce renseignement offre par lui-même un très grand intérêt. De même, les comptables devront être comptés comme « comptable », les mécaniciens comme « mécaniciens », etc. **C’est la pratique elle-même qui nous impose cette règle. Il est donc superflu de discuter si elle est la meilleure (mon avis personnel est qu’elle est, en elle-même, excellente), car nous sommes forcés de la suivre** » (ISI, 1898, 280).

¹⁴² Again, in these discussions, the carpenter is imagined to be a man.

¹⁴³ Although why the imaginary carpenter would be reticent to provide information about himself to a census authority about the regularity and specific location of his work is not specified.

statistics to identify some of the obstacles the IIS encountered while they attempted to standardize statistical list categories including: 1) different *national social category definitions and groupings*, meaning that the same act or social group may be described or grouped together differently in different national contexts, and; 2) *different national institutional data reporting norms*, meaning that statistical information could be reported during different institutional phases, a factor that could also impact the social category definition.

I used the IIS' discussion of the labour categories of the national census to elaborate some of the strategies that the IIS devised to resolve these problems. I chose this debate specifically because it dominates the IIS' discussion of the national census suggesting that the standardized categorization of labour was viewed as important. The solution that the IIS developed, *hierarchical nomenclature*, was a way to unite a potentially infinite number of professional lists by collapsing each list level into the next through the construction of labour families allowing for international comparison. While this technical solution was adopted, it invited substantive questions regarding the definition of specific list categories within and across different nation-states as well as the relation between different levels of the labour nomenclature hierarchy – questions that were simultaneously very practical (because enlightened, scientifically-informed and salaried workers had to be trained to identify the same phenomenon so that they could administer these surveys in the same way ensuring comparability) and intensely theoretical (where should the definition of employment come from? The worker's formation? The institution or industry where they work? Which perspective matters for governance?). The IIS debates on category construction suggest that a broad range of considerations – both practical and theoretical – informed the development of individual categories. These concerns include technical demands of the list itself (ex: standardization of terms across languages, legal and bureaucratic systems both nationally and internationally for the purposes of comparability and ease of application and analysis), ideas of objectivity, Quetelet's idea of social gravity, natural law and social progress and substantive considerations related to the phenomena being measured and its integration into internationally comparable lists. Rather than reflect the nation, these debates describe a variety of practical and substantive concerns and assumptions went into the construction of census categories.

The scope of international standardization: the IIS' global ambitions

Another prominent subject of discussion at the IIS was the question of how to expand the reach of the standardized national census they were developing to uncouneted territories. This was important to IIS members because the project of 19th and early 20th century colonialism was in full effect. The ISI's census tended to focus overwhelming on Europe (both Western and Eastern), as well as Canada, the United States, Japan, Brazil and Argentina (to a much lesser extent). The IIS hoped to enumerate all of humanity so that Quetelet's social gravity could be found – a theme indicated in their founding articles and present in their ongoing debate on “*La statistique de la superficie de la population des contrées de la terre*”¹⁴⁴. Articles with this title appeared three times during the time-period under study and are quite extensive in length - often more than one hundred pages. Organized by Emile Levasseur of the *Collège de France*, their goal was to provide an estimate of the size and density of the global human population. These articles include summaries of the statistical state-of-play in various IIS member nations as well as the colonial projects in Africa, Asia and the Americas¹⁴⁵. Statistics is characterized not just as a science but a ‘heroic exploration’ intended to reveal Nature’s most fundamental truths. Each continent is divided into those places that are independent states and those that were ‘properties’ (either ‘possessions’ or ‘protectorates’) or literal ‘extensions’¹⁴⁶ of European powers. Following the early statistical tradition, each national summary tends to provide a written summary of the land and people (*Lande und Leute*) including remarks on the data collection method followed by tables itemizing land mass and water, the total human population and population density (by square kilometre) by region/province. Land mass was remarked by the IIS to be fundamental to statistical practice because of its utility for

¹⁴⁴ Translation: Statistics of the surface and population of the countries of the Earth.

¹⁴⁵ « *La question des limites de la partie international des recensements est ainsi définitivement fixée. L'Institut n'a qu'à se rallier aux propositions de la section pour que soient mobilisés environ un million de recenseurs expérimentés, afin d'inventorier et de décrire scientifiquement sur un territoire de plus de 70 millions de kilomètres carrés, une masse de huit à neuf cents millions d'hommes! C'est vraiment une pensée édifiante, que de se représenter de quelle façon cette grande armée d'explorateurs disciplinés de la démologie pénétrera, presque au même moment, dans les demeures de toute l'humanité civilisée, depuis les huttes des Esquimaux, jusqu'aux tentes des Bédouins, depuis les wigwams des Peaux-Rouges jusqu'aux bungalows des Indes orientales; comment le million des recenseurs entreprendra le plus grand des reliés sociologiques jamais effectués, pour amener enfin le colossal matériel d'observation réunies à une élaboration uniforme* » (ISI, 1898, 204-205).

¹⁴⁶ As an example, during this period, Algeria was largely administered as a region of France, an approach that was different from other Maghrebi French colonial regions which were classified as possessions or protectorates.

calculating human population density, a metric they found very useful. The national summaries are organized by continent¹⁴⁷.

The IIS Congress discussions focused on detailing and debating the methodology they would use to count independent states and colonized places outside of Europe, particularly places on the continent of Africa. As a brief reminder, the entire continent of Africa was undergoing colonization by French, English, German, Belgian, Dutch, Spanish, Portuguese and Italian powers throughout the 19th century in what has been termed “the scramble for Africa”. The IIS sought human population estimates from African populations as part of the imposition of colonial infrastructure and to establish the global human population amongst other goals. However, they found this task difficult largely because *European* statistical infrastructure did not exist in the places they wished to analyze. These discussions are notable for their detailed reflections on the political and scientific utility of statistics when human population *estimates* had to be calculated. In the remainder of this section, I elaborate on these debates.

The IIS Bulletin suggests that the IIS was willfully blind to literally all political regimes of power that had existed on the continent of Africa previous to European colonization. In a blunt dismissal of literally all pre-European colonial African political structures, the IIS described Africa as ‘uncivilized’ – a viewpoint obviously consistent with 19th century racist tropes: “*En Afrique, il n’y a pas dans la zone torride d’États qui puissent légitimement revendiquer le titre de civilisés*”¹⁴⁸ (ISI, 1886, 15). As a result of this dismissal, the ISI’s statistical portraits of African nations were based only on the impressions and knowledge that *European explorers and colonists* had of the continent that were largely derived through pre-existing trade networks with colonized and

¹⁴⁷ « Il importe de connaître d’abord le nombre des habitants d’une région pour calculer ensuite les rapports qui résultent du mouvement de cette population. Le fait seul de la densité révèle d’ailleurs un certain état de choses qui intéresse la démographie et l’économie politique. On a dressé des cartes par courbes de la densité de la population en Europe; ces cartes constituent un essai, très ingénieux et très instructif, de représentation fidèle de la manière dont les habitants sont véritablement répartis sur le sol; on peut cependant leur adresser le reproche de reposer sur une série d’hypothèses, puisque nulle part, pour ainsi dire, la limite des courbes ne se trouve dans les documents statistiques. Nous joignons d’après un procédé plus vulgairement employé, celui des teintes de densité par circonscriptions administratives ou par régions....Par ce procédé, on obtient une image qui est bien quelque peu factice aussi, puisqu’on suppose que la densité réelle de chaque partie d’une province, est identique à la densité moyenne – ce qui est très loin de la vérité –; mais au moins cette image ne fait que traduire, sans hypothèse, les documents numériques que nous avons enregistrés » (Levasseur, 1886, 18).

¹⁴⁸ Translation: In Africa, there are no States in the torrid zone that can legitimately claim the title of civilized.

independent African states¹⁴⁹. This meant that, in some cases, the numerical entries used to statistically describe African nations were left empty, included question marks or heavily footnoted, “purely hypothetical” numerical estimates were inserted (see Appendix 4 for a demonstration of this technique).

The practice of estimating human populations was quite common in all forms of early European population list making as illustrated through the discussion of hearth counts in Chapter 3. What was new about the ISI’s discussion was the technique they used to estimate human populations as well as the explicit admission of the approximate nature of the numerical information they were providing (see Appendix 5 for the text itself). As the footnotes indicate, estimate for both land mass and human population size were used for independent or newly colonized places where a colonial census had not been done. Estimates of land mass were needed because the land mass of the African nations discussed in the above examples were sometimes not known (in whole or in part) because the national borders were not defined. The national land mass had to be inferred by the ISI, a process that was done based on the planimetric or geographic analysis of the space occupied by countries on existing world maps. Interestingly, the process used to define the borders of individual nations when they were not known is not clarified in these footnotes.

When the human population was not known through the European colonial census, it was estimated by assuming a certain national density metric whose rationale was also not clarified (ex: we assume the national population density of Senegal to be thirty people per square kilometer) - similar to the multiplier technique discussed in the hearth counts Chapter 3 - and the planimetric land estimate. The planimetric method of inferring human population size is notable when compared to the methods used in Chapter 3. Instead of using objects to represent people, it used geographic measurements of the earth’s surface represented through maps coupled with an assumed density metric to infer the number of people in a given metric – a notable departure from the population estimation approaches described in Chapter 3. It yields insight into the nature of

¹⁴⁹ « Si l’on ne connaît pas l’étendue de chance des régions de cette portion du globe, on peut du moins savoir à peu près, par voie géodésique, la surface totale, tandis qu’il n’y a véritablement jusqu’ici aucun moyen de connaître la population. Les chiffres que nous donnons sont de pures hypothèses. Quelque nombreux et quelques hardis qu’aient été les explorateurs de l’Afrique au XIXe siècle, le réseau de leurs itinéraires dans l’intérieur de cette partie du monde forme des mailles très larges et laisse même en plusieurs endroits d’immenses lacunes sur la carte » (Levasseur, 1886, 15).

colonial 19th century state-building, focused more on the conquest of territory for colonial rule and exploitation. This again suggests that the practice of statistics by European powers in colonial contexts was different from European contexts.

Further, the IIS dedicated time to discussing what exactly these land and human population estimates meant and how they should be interpreted by the statistical community given their approximate nature – debates on the objectivity of their measures. These discussions are particularly candid and ruminate not only on the estimates of the African human population but on the purpose and limits of the ISI's entire social statistical project. The IIS did, after all, see itself as a scientific organization pursuing natural law. If the accuracy of the numbers upon which they were basing their claims were known to be estimates - numerical fantasies generated without reference to 'scientifically legitimate' workers, procedures and institutions - what good were they? What possible connection to natural law could these numbers have? Would their estimate nature not invalidate the scientific claim of the entire statistical project? Levasseur – the head of the ISI's global statistical expansion project – poses this problem to the IIS with a provocative simile: the statistician without "rigorously exact" human population and land estimates is like a religious priest with "there is no God" written across their forehead¹⁵⁰. Both figures completely undermine the central purpose of their respective projects and their own different claims to social authority. Levasseur is also contrasting the nature of scientific authority with religious authority and asking how they differ – a comparison that reflects on the political and social authority of science. He resolves the conundrum by reflecting on the nature of hypothesis in scientific projects¹⁵¹. Levasseur draws a distinction between 'pure numerical fantasy' and 'scientific numerical estimate' by arguing that 'scientific numerical estimates' possess *specific conditions of formation, purpose*

¹⁵⁰ « De l'utilité de ces notions, même dans leur état imparfait – On nous objectera peut-être que, quand la statistique n'a que des hypothèses à produire, elle ferait mieux de se taire, et qu'un statisticien qui place en tête d'un travail sur la superficie et la population une introduction dans laquelle il déclare qu'aucune des chiffres de superficie ou de population n'est rigoureusement exact, ressemble aux ministres d'un culte qui inscrirait sur le fronton de son temple : « il n'y a pas de Dieux » (Levasseur, 1886, 17).

¹⁵¹ « Une pure hypothèse n'est sans doute à aucun titre un document de la statistique. Cependant si elle concourt à la formation d'un total dont elle est une partie intégrante avec des éléments statistiques, elle devient légitime, puisqu'elle est nécessaire, à condition qu'elle soit elle-même fondée sur la meilleure base possible et que l'auteur prévienne ses lecteurs. Les hypothèses que nous donnons sur la population de l'Afrique sont dans ce cas; elles ne sont pas de simples fantaisies, mais des estimations qui, tout en étant très critiquables, ont leurs autorités et qui peuvent éclairer quelque peu le lecteur. Elles sont indispensables pour obtenir le total de la population de chaque partie du monde et celui de la Terre que réclame la curiosité publique. La science ne court aucun danger en lui donnant cette satisfaction, pourvu que le lecteur, étant averti, ne cherche pas à tirer, de quelques millions de plus ou de moins dans tel total, des conséquences imaginaires » (Levasseur, 1886, 17).

and *reporting conditions* that render them different. The *conditions of formation* of scientific numerical estimation are founded on the “the best possible basis” – criteria that is not further qualified. The *purpose* of the statistical data collection is also identified as a legitimating concern. Specifically, if the numerical estimates are collected as part of a greater scientific project of determining the global population, they become acceptable when they are aggregated together with other more accurate numbers. Finally, the reporting conditions are different because the numerical estimates are explicitly identified as approximations alongside the conditions of their production. Statistics is not just about imposing an ethic of practice on the workers and institutions but on consumers of statistical data as well. It is the responsibility of the scientific reader given the caveats about the conditions of production to recognize this fact and limiting the scope of their inferences from the data. Based on this reflection, Levasseur concludes that the African statistical land mass and human population estimates are justified; statistics does not undermine its own social authority and it does not mimic the arbitrary authority of religion. He resolves the point through another contrast between science and religion¹⁵².

In a reflection that almost mimics both Porter (1995) and Poovey’s (1995) (much) later analytical conclusions (i.e. statistics represents a form of precision without accuracy), Levasseur suggests that “numbers, whatever they are, can give the appearance of rigour which can be misleading to the public, if they are not informed of the degree of confidence¹⁵³ that should attributed to them”(1886, 17). The numerical nature of statistical inquiry can give the impression of rigour, which is why the *interpretation* (for public audience) should be standardized and clarified. A caveat that reinforces the importance of understanding the social and political debates that give rise to statistical interpretations (and not the mathematics themselves).

¹⁵² « *Nous répondrons que la statistique n’est pas une religion, mais un procédé scientifique et qu’avant tout le devoir du savant est de connaître et de déclarer avec franchise la portée de l’instrument qu’il emploie. Les résultats statistiques se produisent sous forme de nombres, commençant quelquefois par des millions pour se terminer par des unités; or, les nombres, quels qu’ils soient, ont une apparence de rigueur qui impose et qui peut induire en erreur le public s’il n’est pas prévenu du degré de confiance qu’il convient de leur attribuer. Car si le statisticien n’a pu évaluer la matière qu’il traite qu’à un centième près, les centaines sont sans importance pour un total s’élevant à des millions, et les centaines de mille en ont bien peu, si l’approximation n’est qu’à un dixième près. Le calculateur doit donner jusqu’aux unités pour la régularité de ses opérations; mais le philosophe, sachant ce que vaut l’instrument, ne tient compte, si la matière ne comporte pas une approximation plus grande, que des millions pour ses arguments comparatifs. Or, certains nombres relatifs à la population des pays hors d’Europe, ne peuvent même pas être garantis à un dixième près* » (Levasseur, 1886, 17).

¹⁵³ Here, it is important to note that Levasseur is using “degrees of confidence” in its colloquial sense. Statistical histories indicate that the confidence intervals technique was invented by Jerzy Neyman in the 1930s, significantly after this article was published (Mackenzie, 1981).

INTERNATIONALLY STANDARDIZED METRICS

The ISI's emphasis on standardization for international comparability extended beyond the list categories to the ways that *quantitative metrics themselves* were constructed and *their social interpretations* conceptualized. As a brief reminder, many simple statistical concepts such as population averages or correlation, that we now take for granted were open questions for the IIS or had not been developed during the period under study. Work was actively being put into developing, naming and justifying potential metrics for population analysis, particularly for the purposes of international comparability. These discussions are interesting, first, because they illustrate the importance of non-mathematical concerns (such as international comparison) on the construction of quantitative metrics and, second, because they demonstrate the shifting landscape of epistemological orientations that informed the social interpretations of metrics. Both of these factors support the argument developed in the previous chapter, that social statistical tools (lists, metrics and interpretations) were fashioned with particular assumptions and goals in mind that changed as time progressed. This phenomenon highlights both the versatility of mathematical technique and the importance of understanding the non-mathematical factors that influenced the construction of metric interpretations. During the period under examination, Quetelet's typological notions of the nation, natural law and ideal types informed much of these discussions. In this final section, I continue the major arguments of this chapter with a brief examination of two IIS debates regarding the construction of metrics and the generation of social interpretation of these metrics.

Age and sex in death rates

As discussed earlier, there was an ongoing discussion at the IIS about how to best represent population averages according to Quetelet's notion of *homme moyen* as well as the distribution of traits according to the Gaussian curve. The idea was that each nation would be constructed around an ideal-type average and the distribution of traits would be bell-shaped suggesting that the majority would be clustered around the center like copies of a statue. Each nation was expected to have its own national averages representing objective ideal types enabling international comparison. While this metric and interpretation was intended to be universally applicable to all

national phenomena, the IIS encountered difficulties with the application of this metric and interpretation to certain subject matters, namely, that perennial statistical problem: death. Specifically, they had noticed that the death average (*homme moyen*) placed the *majority of deaths in the middle of life* when most deaths were known to occur at either a very young age (infant death) or a very old age (end of life), alongside mortality differences related in sex. Put simply, the death average was confusing because most people were alive when the mathematically calculated average said they should be dead and that was a problem. The metric obviously did not conform to a known empirical reality inviting reflection not just on the relation between substance and technique death rates but, as we shall see, on Quetelet's entire science of *physique sociale*. The IIS engaged in a number of debates that attempted to understand what exactly the incongruity between metric-intended-to-represent-empirical-reality and observed-reality meant and how could it be remedied? This was both a technical and epistemological question.

Technically, the IIS sought to resolve the question of death rates by modifying the calculation of the metric itself. Ogle (1892) suggests that the death rate¹⁵⁴ per 1,000 fails to capture noted sex and age differences in mortality. This was a problem because it rendered international comparison – the point of statistical analysis – impossible because the sex and age distributions within each nation were not reported and could be different, impacting the overall death rate. For example, a nation with higher proportions of men and seniors would likely have a lower birth rate than a nation with higher proportions of women and young people but these differences would be hidden if only a death rate per 1,000 were reported.

The solution, he argued, was to disaggregate national populations by the same age and sex criteria and then compare each nation with an arbitrarily chosen international standard¹⁵⁵. A

¹⁵⁴ “The usual mode of stating the death-rate of any place is to give the proportion between the deaths at all ages, and in both sexes, in the year to the aggregate population, this latter being taken as 1,000. It is manifest, however, that as the chance of dying in a year differs very considerably in the two sexes, and at different ages, general death-rates thus obtained cannot afford a safe basis for comparison between one place and another, in respect of healthiness, unless the sex and age distributions of the populations of the places compared be identical” (Ogle, 1892, 83).

¹⁵⁵ “In order to obviate this, and to obtain death-rates fairly comparable with each other, I think it would be highly desirable to select, at any rate for purposes of international statistics, a standard population, of fixed age and sex distribution, and to ask the officials in each country who are charged with the statistics of mortality, to give each year in their reports the death-rate for their country, as it would have been, had the population agreed in its composition with the international standard. What this standard population should be is not of very great importance. The point of most importance is that some standard should be selected and generally adopted. If, therefore, I suggest one, it is merely to complete my observations” (Ogle, 1892, 83).

standard population was necessary to enable comparison because each nation would likely have different age and sex proportions. The difference between each country's disaggregated sex and age distributions and the international standard would provide meaningful basis for comparison.

Homme moyen or Excelsior? Reinterpreting the average and the Gaussian curve

While the disaggregation of death rates by age and sex was one technical solution to the problem of death averages developed by the ISI, there was a faction of the IIS who used the incongruity in death averages and empirical deaths to engage a deeper discussion about the ISI's epistemological assumptions behind their statistical metrics, particularly their heavy reliance on Quetelet's ideas. This discussion was part of a shift in statistical thinking that is well-documented in the secondary literature towards the now-discredited sciences – that at the time were considered 'cutting-edge' and 'modern' - of Francis Galton's eugenics, Cesare Lombroso's criminology and Franz Joseph Gall's phrenology. All these approaches developed statistical techniques to interpret 'precise' measurements of human bodies with the goal of crudely and inevitably rooting out social behaviours in them (MacKenzie, 1981; Porter, 1986; Desrosières, 2008a). Alfred de Foville (1908) – an IIS member, French economist and minor figure in the history of statistics who appears to have been very influenced by Francis Galton's *Natural Inheritance* (1889) – provides a very useful articulation of the type of critique that was used to shift influence away from Quetelet's program towards Francis Galton's eugenics. Although Foville's (1908) arguments are very obviously flawed, what is particularly interesting about them is the way they attempt to *shift the meanings of metrics*, particularly Quetelet's interpretation of *homme moyen* (average) and the Gaussian curve.

Notably, they do not offer a different way of calculating these measures but a different *interpretation* of what these metrics mean in relation to nature. Specifically, the interpretation of Quetelet's metric of *homme moyen* – a simple population average - was the primary target of Foville's (1908) critique. What for Quetelet was an ideal-type - an indication of an other-worldly perfection - was totally banal for Foville (1908). The problem was what Foville (1908) characterized as the metric's blandness¹⁵⁶. The exact centre of the Gaussian curve – traits

¹⁵⁶ « L'homme dont je vais parler n'est pas une de ces figures originales qui, par l'étrangeté, s'imposent à l'attention. Loin de là: on chercherait en vain, dans une collection de passeports ou de permis de chasse, un signalement aussi banal que le sien: visage ovale, nez ordinaire, yeux gris, bouche quelconque...; signes particuliers: Néant! La seule

simultaneously omnipresent and elusive – was unremarkable exactly for this reason. Foville (1908) illustrates this point by drawing an analogy between Quetelet’s average and another outdated early 19th century technique called *composite photography*. Developed by Francis Galton, this technique sought to ‘infer’ typological physical characteristics common to groups of people by exposing multiple photographs together, creating a photographic image containing each person’s face overlaid one over each other. The idea was that the amalgamated image would ‘reveal’ the ‘average’ facial feature common to different ‘natural types’ of people. In both technological cases, the average typological trait was by definition unremarkable: “*L’homme medius des statisticiens est, nécessairement, aussi incolore que celui des photographes*¹⁵⁷” (Foville, 1908, 37). Not only was the average as a measure unremarkable, Quetelet’s assumption that a *homme moyen* or an average for every natural phenomenon could be found was also false. Foville (1908) elaborated his arguments by returning to the well-known and troublesome example of death rates¹⁵⁸. He argued that if *homme moyen* was universally present in nature – the result of a rigid natural law - then it should always correspond to the majority. Yet the incongruity between the death average (middle of life) and the death majority frequency (very early life and very end of life) disproves this because the death average (*homme moyen*) *did not relate to the empirically observable majority* in the same way that average height or average weight do.

caractéristique de l’Homo medius, c’est de n’en avoir aucune puisqu’il représente, par essence, l’exacte moyenne des qualités et des défauts de l’espèce: taille moyenne, poids moyen, appétit moyen, santé moyenne, intelligence moyenne, ce qui est peu; moralité moyenne, ce qui n’est pas beaucoup. Tout cela ne constitue pas un ensemble très séduisant, ni même très réel. Avons-nous jamais, sur notre chemin, rencontré le vrai Homo medius ou la vraie Femina media? Je me souviens pourtant d’avoir eu en main leur portraits. Dans je ne sais quel canton suisse, un patient opérateur avait photographié, de face, tous les mariés, pendant plusieurs années de suite, et était arrivé, par voie de superposition, à fondre tous ces jeunes couples en un seul. Le résultat n’avait rien de savoureux: ni beauté, ni laideur; pas d’expression, et, comme de juste, aucune personnalité » (Foville, 1908, 37)

¹⁵⁷ Translation: Statisticians’ *homo medius* is necessarily as colourless as that of photographers.

¹⁵⁸ «*Il se rencontre notamment en matière démographique certaines moyennes dont les fait quotidiens semblent fuir le contact au lieu d’y aspirer. De toutes les moyennes qui nous concernent personnellement, je n’en sais guère de plus importante pour nous que l’âge moyen de la mort; et les statisticiens mettent depuis longtemps tous leurs soins à le bien déterminer. Mais contrairement à ce qu’on observait s’il en était de nos existence comme de nos tailles ou de nos poids, la vie moyenne n’est pas la même chose que la vie probable; et ni la vie probable ni la vie moyenne ne sont la vie normale, celle à laquelle la nature convie l’homme sain. En fait l’âge moyen de la mort est un âge où l’on meurt peu et nos cimetières le savent bien. La mortalité humaine accuse deux maximums différents dont l’un précède de beaucoup l’âge moyen du décès - c’est la mortalité infantile - et dont l’autre le suit d’assez loin - c’est la mortalité sénile. Oui: cette “difficulté de vivre” dont se plaignait Fontenelle quasi centenaire sévit chez les nouveau-nés plus encore que chez les vieillards; et entre ces deux pôles mortuaires la vie moyenne se fixe comme elle peut déterminée par une simple association de chiffres divergents et ne correspondant nullement aux conditions ordinaires de notre destinée »* (Foville, 1908, 42).



Figure 14: Foville's (1908) illustration of the Gaussian distribution of men's heights with a clear average centre (p.40)

Instead, Foville (1908) hypothesizes two types of 'majority centre metrics' that can be used to better describe the occurrence of human deaths: the mathematically-calculated *average life* ($A1+A2+A3+...AN/N$) (*homme moyen*) and the empirically-observable *normal life*¹⁵⁹. In this contrast, it is the empirically-observable normal life that reflects what-is-going-on-in-nature. Quetelet's average life is just a technical figment¹⁶⁰, "the simple association of divergent numbers that in no way correspond to the ordinary conditions of our destiny" (Foville, 1908, 42). Not only was the average (*homme moyen*) not reflective of the-majority-in-reality, the assumption that the Gaussian curve was universally representative of the distribution of all traits in nature was also false¹⁶¹. The reason for these errors was Quetelet himself who, in his ambitious search for 'social gravity', had remarked on but ignored known exceptions to his ideas. Had he better incorporated these known exceptions into his science, he would have grappled with the inconsistency between death averages and the empirical occurrence of death resulting in a better theory.

¹⁵⁹ « Il y distinguait judicieusement les normales des moyennes proprement dites et, en particulier, la durée normale de l'existence humaine de sa durée moyenne. L'homme moyen de Quetelet n'a qu'une vie écourtée. Bien qu'il nous apparaisse sous les traits d'un adulte, sa carrière se trouve réduite d'avance par ces légions de petits êtres que l'on voit mourir au berceau » (Foville, 1908, 43).

¹⁶⁰ «La mortalité humaine accuse deux maximums différents dont l'un précède de beaucoup l'âge moyen du décès - c'est la mortalité infantile - et dont l'autre le suit d'assez loin - c'est la mortalité sénile. Oui: cette "difficulté de vivre" dont se plaignait Fontenelle quasi centenaire sévit chez les nouveau-nés plus encore que chez les vieillards; et entre ces deux pôles mortuaires le vie moyenne se fixe comme elle peut déterminée par une simple association de chiffres divergents et ne correspondant nullement aux conditions ordinaires de notre destinée » (Foville, 1908, 42).

¹⁶¹ «Cette généralité, le tort de Quetelet est de l'avoir exagérée. Il n'ignorait pas les exceptions auxquelles sa loi est sujette, mais il les négligeait; et, comme il tenait à mettre dans l'homme moyen tout l'homme, son système perdit en solidité ce qu'il voulait gagner en surface. Il existe ici-bas des moyennes de qualités très inégales et il s'en faut de beaucoup que la courbe binomiale soit le régulateur universel de la création. Le corps humain lui-même, champ d'exploration préféré du grand sociologue belge, a ses caprices aussi bien que ses habitudes. La constante, comme dit Quetelet, varie avec les sexes et à plus forte raison avec les âges, mais aussi avec les races, les lieux, les temps... » (Foville, 1908, 42).

In addition to the limitations that Quetelet's hubris imposed on the development of his statistical metrics, the other major problem with Quetelet's science was its democratic ideals which Foville (1908) suggested were woven into the metric's interpretation. In Foville's (1908) estimation, Quetelet's *homme moyen* and *physique sociale* were too "bourgeois" because they idealized qualities possessed by the majority. While Foville (1908) believed there was some utility in tracking the traits of the majority, he did not think they should be idealized because they were simply too "egalitarian"¹⁶². Instead of a quantitative metric that idealized the majority, Foville (1908) argued that 'exceptional' and 'heroic' figures like Nietzsche's *übermensch*¹⁶³ should be idealized in quantitative metrics. Based on this idea, Foville (1908) reinterprets Gauss's curve to reflect a spectrum of "excellence" and (perceived) "social utility". In this reimagining of the Gaussian curve, the traits possessed by the majority are characterized not as the national ideal as Quetelet suggests but "mediocre":

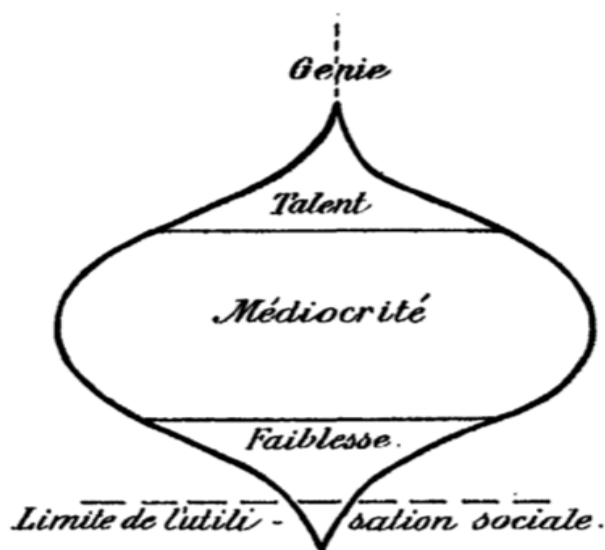


Fig. 2.

Figure 15: Foville's reinterpretation of the Gaussian curve according to (perceived) 'social utility' (Foville, 1908, p. 47)

¹⁶² « Voilà bien à quoi se réduisent aujourd'hui les aspirations d'une démocratie trop égalitaire. Intellectuelle ou morale, la grandeur devient (surtout chez nous) de moins en moins populaire et le suffrage universel en témoigne par son indifférence croissante à l'égard des sommités. Démocratie, médiocratie, dit-on quelquefois. Giuseppe Guerzoni, quand il est mort se préparait à écrire une 'storia delle idee medie' dont la conclusion eût été que ce sont les idées moyennes qui gouvernent le monde. « Peut-être, mais tant pis! » protestait M. Achille Loria¹⁶². Ce qui est sûr, c'est que le « héros » de Carlyle et le « surhomme » de Nietzsche ont également cessé de plaire. La supériorité individuelle devient plutôt un grief qu'un titre à l'admiration et à la reconnaissance publiques. L'homme moyen restera pour quiconque s'adonne à « l'étude numérique des faits sociaux » une forme de comparaison instructive, un instrument de travail commode, un bon serviteur, si l'on veut : mais ne laissons pas dire que les statisticiens font de lui leur idéal » (p.48).

¹⁶³ Clearly, there are a host of problems with the use of Nietzsche's *übermensch* in this context.

Galton's eugenic influence is evident in Foville's (1908) argument— a phenomena that is very well examined in both Zuberi (2003) and MacKenzie's (1981) excellent works on statistical history. What is notable about it for the purposes of this dissertation is the way that Foville (1908) is discussing the socially normative and political implications of Quetelet's metric and science. The calculation of the average and distribution of the frequency of traits under the Gaussian curve does not change *but their interpretation does* and does so based on political values. Foville's (1908) intends his interpretation of the average to be 'less democratic, bourgeois and meritocratic' than Quetelet's, favouring a eugenic political program based on "exceptionality", "heroism" and (perceived) "social utility".

Foville's (1908) arguments are clearly flawed. The point of this exposition is to illustrate that the assumptions *behind* statistical practice – the empirical science intended to scientifically and objectively tell us what exists in social reality – *shifted according to the political program they are intended to serve*. Quetelet's "vulgar" and "bourgeois" average glorifying a "mediocre" ideal is replaced: "*Laissons au vulgaire son idéal bourgeois: In medio virtus. La devise de l'homme de coeur, c'est: Excelsior*¹⁶⁴ » (Foville, 1908, 49).

SUMMARY

In this chapter, I used a content analysis of the ISI's early volumes from 1886-1912 to understand how statistical practices for the analysis of national populations developed. While statistics is obviously a technique that has since been applied to anything, the major problematic for which it was developed in this early period was the analysis of the nation-state. It was chosen because of Quetelet's towering influence over the development of 19th century statistics, particularly his idea of natural law and typological forms of social organization which this chapter demonstrates were enshrined into the ISI's early articles of organizational incorporation. These epistemological assumptions regarding what exactly statistical techniques were 'revealing' about the nation-state

¹⁶⁴ Translation: Leave to the vulgar their bourgeois ideal: in medio virtus. The motto of the man of heart (courage) is Excelsior

render the ISI's early debate into the construction of the tools that would be used to conduct empirical research on national characteristics and trends particularly insightful.

This chapter examines this thematic through two questions: 1) What general topics about national populations did the IIS address? and, 2) How were statistical institutions, social categories and statistical metrics developed and made meaningful for the study of national populations? I answered the first question by reporting the results of the overall frequency of the codes from my analysis. The results find that in terms of absolute frequency, codes related to the economy, labour and workers, standardization of national statistics for international comparison and statistical theory were the most common themes addressed by the ISI. Broadly, they suggest that economic characterizations of nation states and the development of techniques, particularly those related to international standardization of categories and technique, attracted the most debate during this period.

I then developed my response to the second question by analyzing the results of the *Statistical Theory*, *Bureaucratic organization of statistics* and *National population and international comparison* codes. First, I demonstrated Quetelet's influence over the structure and institutional goals of the IIS through an examination of the first issue of the IIS in which they develop their organizational structure and statistical mission. I then elaborated on the models that the IIS promoted for the organization of statistical bureaucratic organizations, including workers. I discussed the project of international standardization of statistical lists. I examined some of the hurdles to standardization through the example of the ISI's discussions of criminal statistics. I then discussed some of the techniques the IIS used to overcome these hurdles through an examination of the labour section of the national census. I used an ongoing discussion over the construction of death rates to illustrate how international standardization influenced the construction of metrics. Finally, I used Foville's (1908) critique of *homme moyen*, the Gaussian curve and *la physique sociale* to indicate the ISI's shifting epistemological assumptions behind statistical measures and to stress the changing and conventional nature of statistical interpretation.

I conclude that many of the debates used to generate the statistical lists and metrics that were intended to 'scientifically' and 'objectively' demonstrate which groups and trends constituted national publics were developed in this initial statistical phase with the goal of international standardization in mind. I argue that the goal of international comparability promoted a strange form of methodological nationalism which demanded that the list categories be the same for each

participating nation-state so that meaningful comparison could be made. This goal mandated a peculiar and very literal form of methodological nationalism that insisted on categories believed to be universally present and analytically useful in all nations.

Further, the debates surrounding how exactly social categories should be applied for the purposes of statistical analysis demonstrates a fascinating and inconclusive oscillation between technique and substance, lived experience and social fact, theory and empiricism. They yield insight into the connection between epistemological assumptions about the nation as well as 19th century norms of scientific objectivity. As the IIS issues progress, these discussions demonstrate a shifting epistemological landscape suggesting Quetelet's waning influence at the IIS in favour of Francis Galton's eugenic agenda that became the major epistemological influence for much of the early 20th century (MacKenzie, 1981).

CONCLUSION

“It is important to understand that we cannot really say we know what we mean by any quantitative magnitude until we have formulated rules for measuring it. It might be thought that first science develops a quantitative concept, then seeks ways of measuring it. But the quantitative concept actually develops out of the process of measuring” (Carnap, 1974, 68).

How should the nation-state be measured? This dissertation has investigated the development of a particular language – an authoritative and scientific administrative vernacular - used to understand and administer national populations that was developed by Pierre-Simon de Laplace, Adolphe Quetelet and the IIS during the 19th and early 20th centuries. It opened the black box of statistics by examining some of the conversations that generated the early rules for statistical analysis of national publics.

Specifically, I use the STS literature to analyze some ideas and debates of the premier groups of scientists responsible for this project as they 1) epistemologically justified the application of mathematical techniques to the study of human social groups and 2) expanded and refined existing list-making techniques and developed meaningful quantitative metrics to understand the social categories included in those lists. I argued that rather than a technique of evidence, statistics should be included and theorized as a form of nation-building similar to literacy and the standardization of national vernaculars (Hobsbawm 1979; Anderson, 2006).

I demonstrated that during the period of study, the practice of statistics integrated a form of methodological nationalism into its epistemological justification and techniques. Following Desrosières (2008a), I examined this phenomenon more closely by looking at the practical work and institutional protocols that went into the collection of population lists and their quantitative analysis as well as the epistemological thinking that promoted the nation as a natural unit of social organization. I used this information to argue that the use of statistics to describe social reality reifies the social processes, institutions and epistemological assumptions used to generate these numbers, rendering the numbers both scientifically and politically ‘objective’. A recognition of the work behind their collection and the assumptions, debates and goals made while generating techniques forces us to recognize the approximate nature of social numbers (despite the precision that the mathematical technique allows) and their intimate and inseparable relation to the social and political processes that generate them. It is an important phenomenon to study because

statistics during this period was (and continues to be) the major techniques used to scientifically and objectively ‘see’ the nation-state.

This dissertation makes three key conceptual contributions to two separate academic literatures: 1) *the literature on methodological nationalism* (Wimmer and Glick-Schiller, 2003) and *the literature on 19th-century nationalism* (Hobsbawm, 1979; Anderson, 2006; and 2) *the history of science and STS literature on 19th-century statistics* (Patriarca, 1996; MacKenzie, 1981; Prévost, 2008; Desrosières, 2008b). First, I argue that there is a tendency in the nationalism literature to *under-problematize* the contribution of 19th-century statistics to the construction of national imaginations. When statistics is mentioned, it is often reduced to issues around the construction of social (and linguistic) categories of belonging (Hobsbawm, 1979; Hobsbawm and Ranger, 1992). These subjects are clearly worthy of attention but the story of the specific statistical techniques themselves – including the administrative systems implemented to collect social information from largely illiterate populations, the efforts to standardize list categories intra- and inter-nationally and the epistemological justification for the application of mathematical techniques from astronomy to the interpretation of social lists – are not interrogated, not even by Anderson (2006). I contend that this is a missed opportunity, particularly given the ongoing prevalence of methodological nationalism in the practice of social analysis (Landolt, Goldring & Pritchard, 2022; Wimmer & Glick-Schiller, 2003).

Second, I extend the small existing literature on early European list-making. I note that histories of statistics tend to include a very limited interrogation of early lists (usually only the London plague counts that were used as the basis for John Graunt’s *Political Arithmetik*). They treat list-making as a *fait accompli* and not a technique that was itself also developed over time (Todhunter, 1949; Chatterjee, 2003; Hald, 2003). This dissertation puts a number of detailed secondary literatures on historical list-making practices - many of which were only published in French or deal only with single regions - into conversation with one another, allowing me to make more general observations about social list-making practices conducted by European powers on European and colonized territory from the 16th-century onwards. Finally, through my analysis of the early texts used to justify the application of quantitative techniques to the social sphere and the early IIS debate, I argue that international comparison was an explicit goal of early statistical practice that promoted the standardization of bureaucratic organizational structures, data collection work practices and statistical categories across IIS member nation-states. I connect this to

Quetelet's epistemological vision for a quantitative social science and observe that these ideas and assumptions contributed to a very literal methodological nationalism in the early practice of statistics.

I developed this argument in the following way. In *Chapter 2*, I elaborated my research question, problematic, theoretical framework and methods. I identified two academic literatures that examine the formation of the 19th century nation-state and nationalism, specifically modernist ideas of the nation-state and methodological nationalism and the Foucauldian literature on governmentality, and pointed to gaps in their theorization of statistics. I then developed Desrosières' (2008a; 2008b) historical sociology of quantification as the major framework for this study. I used his two-stage quantification framework based on 1) the construction of taxonomies and 2) the establishment of mathematical conventions of equivalence to structure the remainder of the work. Finally, I describe the methods used in each chapter.

In *Chapter 3*, I began my initial examination of the construction of taxonomies and historical list-making techniques used by 16th-18th century European state-apparatuses using the STS literature, particularly Bowker and Star's (2000) framework for understanding boundary objects and the construction of standards and lists. It is intended to re-situate scientific and technological ideas within their conditions of generation by examining the motivations for and uses of counts and the practical work and workers who perform it. I used this chapter to examine the development of early list-making and variable categories in order to establish a baseline for how lists were constructed before the 19th century. I examined four major types of lists that were historically used by early European state-apparatuses to enumerate people: plague counts, parish registers, hearth counts and colonial counts (colonial censuses and trans-Atlantic slave trade 'inventories'). I concluded that the rationales for these counts are diverse and included public health, taxes, taxation, religious/social conformity and control, military conscription, conquest of territory, enslavement of people and labour exploitation. They were mandated and conducted by various administrative infrastructures including the Catholic or Anglican Church, state officials (sheriffs, constables, etc.) of the city-state or kingdom, military officials, colonial administrators or some combination of these administrative bodies. Generally, the people doing the counting were a mixture of people counting as they performed some other role (ex: gravedigging, tax collecting, colonial administrator, customs). Finally, I found that European state apparatus' counts of non-European locations (including their frequency, rigor, scope and importance attributed to

counts) were all much higher. This analysis demonstrates the evolving technique of list-making and its connections to political programs of social control, health and conquest.

In *Chapter 4*, I continued my analysis of list-making practices into the 19th century with a view to understanding how the emergence of the nation-state influenced population enumeration practices and the project of the ISI. Specifically, I described the major scientific and political influences of the metric system, the reorganization of the academic system in Napoleonic France, the Belgian central statistical commission bureaucratic model and the early institutionalization of the national census in order to describe the broader scientific and social *zeitgeist* surrounding 19th century nation-building.

I then moved to *Chapter 5* where I shifted to the second phase of Desrosières' (2008a; 2008b) historical sociology of quantification: the establishment of mathematical conventions of equivalence. I began by examining the epistemological framework that was used to apply mathematical techniques to the analysis of human groups. I examined four major, early treatises arguing for the application of probability theory to the study of social world. They are Pierre Simon de Laplace's *Essai philosophique sur les probabilités* (1814) and Adolphe Quetelet's *Lettres sur la théorie des probabilités appliquée aux sciences morales et politiques* (1846), *Du système social et des lois qui le régissent* (1848), and *Physique sociale ou le développement des facultés de l'homme: Tome I* (1869). I chose these texts because they are frequently identified in the secondary literature as being very influential to the field (see, for example, Stigler, 1999; Desrosières, 2008a, Gigerenzer et al., 1989). They are fascinating because they were written at a time when the statistical study of human populations was not accepted. They contain extensive arguments for why quantitative techniques (largely imported from astronomy) *could* be applied to population counts intended to convince funders and expert audiences of their utility. They also justify social statistics using one major analogy: the social world was equivalent to the natural world. The secrets of the natural world had been revealed, now social gravity must be found and politics driven by Nature's will. I suggested that Quetelet's epistemological arguments for social statistics made the nation into an ideal type, whose 'true' existence was *literally only visible through the use of quantitative methods and probability theory* – an idea about scientific objectivity that I argue is reflective of Daston and Galison's (2007) 'truth-to-Nature' approach. I also examined the ways that Quetelet extended Laplace's arguments by developing concrete metrics that could be used to analyze aggregate observations and their social interpretations and providing suggestions for

organizational structure, work practice and ethical protocol that could be implemented by national statistical bureaus so that their statistical data could be considered accurate.

In *Chapter 6*, I discussed the general results of my analysis of the *Bulletin of the International Institute of Statistics* from 1886-1912 and then proceeded to examine articles contained in specific codes that are relevant for my research question. In this chapter, I asked: 1) What general topics about national populations did the IIS address? and, 2) How were statistical institutions, social categories and statistical metrics developed and made meaningful for the study of national populations? I found that economic characterizations of nation states and the development of techniques, particularly those related to international standardization of categories and technique, attracted the most debate during this period. I also demonstrated Quetelet's influence over the structure and institutional goals of the ISI. Next, I elaborated on the models that the IIS promoted for the organization of statistical bureaucratic organizations, including workers. I then discussed the project of international standardization of statistical lists through an examination of the IIS debates regarding the labour portion of the national census, criminal statistics and domestic workers. I illustrated the development of hierarchical nomenclature as an analytic strategy intended to enable international standardization. I described the carpenter in the porcelain factory thought experiment the IIS used to test their approach.

Finally, I explored some of the discussions related to the project of 19th century colonialism and the scramble for Africa, particularly the role that statistics played in this project. I described the difficulties colonial administrative bodies encountered attempting to collect birth, death and marriage information from existing social institutions in Egypt noting both lack of participation by the Egyptian population (who furnished this information) and Egyptian social institutions (who collected this information) as the primary source of this difficulty. I then described the challenges the IIS encountered attempting to calculate population sizes and land mass in recently colonized African nation-states. The IIS willfully ignored all existing African social systems and institutions because they did not believe them to be 'civilized'. Instead, they based their estimates on the very limited European knowledge derived from explorers and geography. These debates are interesting because they provide another illustration of techniques used to count humans discussed in Chapter 3. In this case, however, instead of using objects to infer the presence of humans, measures of the earth's surface were used. These discussions

included debates regarding the accuracy of this estimate which bleed into broader reflections on the objectivity and social authority of the statistical project.

I then shifted to an examination of the types of debates that accompanied the development of metrics, either regarding their construction or their interpretation. First, I examined some of the debate surrounding death rates which were extensively discussed because the known empirical reality did not conform to Quetelet's notion of the average and Gaussian variance. I explored the disaggregated approach suggested by the English statistician, Ogle (1892), that sought to address the problem by disaggregating the data by age and comparing it to an international standard in order to generate a metric that was internationally comparable and meaningful. Second, I examined arguments that sought to change the interpretation of the Gaussian distribution curve, undermining Quetelet's ideal and democratic notion of *homme moyen* at the IIS and shifting it towards Galton's eugenic notion of exceptionality.

I concluded that many of the debates used to generate the statistical lists and metrics that were intended to 'scientifically' and 'objectively' demonstrate which groups and trends constituted national publics were informed by Quetelet's epistemological ideas. I argued they were developed with the goal of international comparability in mind which had the impact of promoting methodological nationalism through the standardization of list categories amongst nation-states.

Historicizing and socializing technique

This dissertation has analyzed some of the social and political production of simple statistical tools - lists, the census, averages - at a time when the use of mathematical techniques to describe human populations was novel, unjustified and contested. In this period, statistics was the science of the state and did *not* apply to everything. Its goal, derived from Laplace and Quetelet, was to use statistics to 'reckon' the typological nation put in place by natural law and govern based on its infallible will. This would ensure that clear political aberrations like the *Ancien Régime* could never again form. While obviously incongruent with our current notion of statistics and the nation-state, these assumptions informed both the organizational goals and interpretations of the early IIS and promoted a very literal form of methodological nationalism in the early practice of statistics.

If we follow Shapin (2010), we know that neither idea nor technique is universally accepted at its inception. Not even the greatest single thinker sitting alone in a room has the power to birth a notion so powerful that it instantly appears in the mind of everyone in the scientific

community. To think so would be a kind of scientific immaculate conceptual conception. This means that the process by which ideas and techniques are accepted, and *the conditions of that acceptance*, are rich and important subjects of inquiry – both for those interested in academic study of their histories and those interested in their applications. During the 19th and early 20th centuries, the experts, ‘esteemed’ men (literally) of politics, military and science, had to be convinced of the utility and veracity of statistical approaches to governance and the IIS was one of the primary forums where some of these debates took place, often with a grandiose and unbridled hubris. The arguments that they use to convince each other bridge the gap between the scientifically ‘refuted’ and the ‘true’. They represent the negotiation between different structures of authority and proof. In the case of statistics, the arguments used to justify the application of probabilistic techniques to the study of nation-states were based on the assumption that the social world functioned in the same way as the natural world. These arguments were brought about by a broader political desire to use Enlightened science to analyze human populations.

Further, as Carnap (1974) observes, statistics is only meaningful if the rules for social measurement are accurately generated and applied consistently. My analysis shows the generation of social measurement rules for statistical analysis is a social and historically contingent activity. The benefit of the analysis of early statistical debate is the relative simplicity of the techniques, the limited fields of statistical applications and the unformed nature of scientific and governmental structure. This meant that the IIS were required to consider not just how mathematical techniques should be constructed to articulate the problematic they were attempting to quantify but also consider the structure of bureaucratic organization, the workers performing the work, notions of objectivity, lived experiences of the social world and, most importantly, their belief that they were literally ‘revealing’ the natural human grouping of the nation in their statistical debate. The point is not to suggest that any one of these historical considerations necessarily determine the content of findings. Rather, the point is that mathematics, however unique and precise, is just a language that can be used to describe the world and not the world itself. If we are to understand and critique statistical thinking in governance, we must include a nuanced understanding of social and political processes behind the *mathematical procedures themselves* – both the work done to enumerate the human population into discrete categories and the assumptions or problematics driving the development of quantitative metrics – into our analysis. Data is social, relational, political and debatable.

Appendices

Appendix A: Extract from the 1886 IIS membership list illustrating the names, professional status and locations of members.

Noms	TITRES	ADDRESSES
Czoernig, Karl Baron. . .	K. K. Wirklicher geheimer Rath, früher Präsident der K. K. Statistischen Central-Commission	Görz.
Engel, Dr Ernst	Geheimer Ober-Regierungsrath früher Direktor des Kön. Preussischen Statistischen Bureau	Dresden.
Ferrara, Professore Francesco.	Senatore del Regno, direttore della R. Scuola superiore di commercio	Venezia.
Goschen The Rt Hon. G. J.	M. P. Formerly Minister of State, president of the Poor Law Board etc	London.
Kautz, Dr Julius	Mitglied des ung. Oberhauses, Professor an der Universität, Mitglied der ung. Akademie der Wissenschaften.	Budapest.
Lampertico, Fedele	Senatore del Regno	Vicenza.
Laveleye, Emile de	Professeur à l'Université	Liège.
Leroy-Beaulieu, Paul . . .	Membre de l'Institut de France, Professeur au Collège de France	Montplaisir par Lodève Hérault et Paris.
Lingre, le Général	Président de la Commission centrale de statistique de Belgique, etc.	Bruxelles.
Magliani Agostino	Ministro delle Finanze	Roma.
Mayr, Dr Georg von	Unter-Staats-Secretär	Strassburg.
Oettingen, Dr Alex. von . .	Professor an der Universität	Dorpat.

CADRE INTERNATIONAL POUR LE RECENSEMENT DU MONDE ¹⁾

**Population totale depuis le commencement du siècle,
à l'époque de chaque recensement.**

Tableau I.

DATE EXACTE des recensements	Superficie en kilom. carrés à l'époque de chaque recensement.	Population recensée (Popul. de fait autant que possible)			OBSERVATIONS. Consigner notamment: les modifications territoriales survenues entre deux re- censements avec indica- tion de la superficie et de la population des territoi- res perdus ou annexés.
		masc.	fém.	Total.	

**Population par âge et par État Civil (Recensement
le plus voisin de . . .) (a).**

Tableau II. Date exacte du recensement: le 18 . . .

GROUPES d'âge.	Célibataires		Mariés		Veufs		Divorcés		Total		Total général	Observations
	masc.	fém.	masc.	fém.	masc.	fém.	masc.	fém.	masc.	fém.		
0—1 an												
1—2 ans												
2—3 "												
3—4 "												
4—5 "												
5—9 "												
10—14 "												
15—19 "												
20—24 "												
25—29 "												
30—34 "												
35—39 "												
40—44 "												
45—49 "												
50—54 "												
55—59 "												
60—64 etc												
65—69 ans												
70—79 "												
80—89 "												
90—99 "												
100 ans et au-dessus												
Inconnu.												
Total . . .												

(a) Il y aura 5 tableaux semblables pour chaque pays, 1850, 1860, 1870, 1880 et 1890.

Appendix C: Bertillon's professional nomenclature, adopted by the IIS in 1898, intended for global use (1898, p. 240 and 243)

N. 35^{me}.

PROJET DE NOMENCLATURE DES PROFESSIONS

Présenté à l'Institut international de statistique (Session de Chicago 1898)

Par le Dr JACQUES BERTILLON

Chef de la statistique de la Ville de Paris

AVIS

Le but de la présente nomenclature est de rendre les statistiques des divers pays comparables. Les administrations statistiques qui voudront contribuer à cet important résultat, resteront libres de réduire ou d'augmenter, à volonté, le nombre des rubriques. Mais il est indispensable qu'elles veuillent bien s'astreindre à grouper les rubriques comme l'indique la présente nomenclature; c'est-à-dire à réunir les mêmes "groupes", professionnels dans les mêmes "chapitres", et les mêmes chapitres dans les mêmes "classes".

RÉSUMÉ GÉNÉRAL DES TROIS NOMENCLATURES PRÉSENTÉES.

DIVISIONS GÉNÉRALES	1 ^{re} NOMENCLATURE	Nouveaux des rubriques inscrites
		1 ^{re} 2 ^{de} 3 ^{de} 4 ^{de} 5 ^{de} 6 ^{de} 7 ^{de} 8 ^{de} 9 ^{de} 10 ^{de} 11 ^{de} 12 ^{de} 13 ^{de} 14 ^{de} 15 ^{de} 16 ^{de} 17 ^{de} 18 ^{de} 19 ^{de} 20 ^{de} 21 ^{de} 22 ^{de} 23 ^{de} 24 ^{de} 25 ^{de} 26 ^{de} 27 ^{de} 28 ^{de} 29 ^{de} 30 ^{de} 31 ^{de} 32 ^{de} 33 ^{de} 34 ^{de} 35 ^{de} 36 ^{de} 37 ^{de} 38 ^{de} 39 ^{de} 40 ^{de} 41 ^{de} 42 ^{de} 43 ^{de} 44 ^{de} 45 ^{de} 46 ^{de} 47 ^{de} 48 ^{de} 49 ^{de} 50 ^{de} 51 ^{de} 52 ^{de} 53 ^{de} 54 ^{de} 55 ^{de} 56 ^{de} 57 ^{de} 58 ^{de} 59 ^{de} 60 ^{de} 61 ^{de} 62 ^{de} 63 ^{de} 64 ^{de} 65 ^{de} 66 ^{de} 67 ^{de} 68 ^{de} 69 ^{de} 70 ^{de} 71 ^{de} 72 ^{de} 73 ^{de} 74 ^{de} 75 ^{de} 76 ^{de} 77 ^{de} 78 ^{de} 79 ^{de} 80 ^{de} 81 ^{de} 82 ^{de} 83 ^{de} 84 ^{de} 85 ^{de} 86 ^{de} 87 ^{de} 88 ^{de} 89 ^{de} 90 ^{de} 91 ^{de} 92 ^{de} 93 ^{de} 94 ^{de} 95 ^{de} 96 ^{de} 97 ^{de} 98 ^{de} 99 ^{de} 100 ^{de}
A PRODUCTION DE LA MATIÈRE PREMIÈRE	I. Exploitation de la superficie du sol.	1. Travaux agricoles. 1 6 21 2. Pêche et chasse. 1 1 5 3. Populations nomades. 1 1 1 Nombre total des rubriques comprises à l'agriculture. 3 7 28
	II. Extraction de matières minérales.	4. Mines. 1 2 10 5. Carrières. 1 2 10 6. Salines, etc. 1 2 2 Nombre total des rubriques comprises à l'extraction de matières minérales. 3 6 22
	III. Industrie d'après la nature de la matière	7. Textiles. 1 24 41 8. Cuir, peaux et matières dures tirées du règne animal. 1 6 27 9. Bois. 1 7 12 10. Métallurgie. 1 10 53 11. Céramique. 1 4 13 12. Produits chimiques non mentionnés dans les précédents
	IV. Industrie d'après la nature de la matière	13. Produits chimiques non mentionnés dans les précédents. 1 4 13
B TRANSFORMATION ET EMPLOI DE LA MATIÈRE PREMIÈRE		

PROJET DE NOMENCLATURE DES PROFESSIONS.

1^{re} NOMENCLATURE
CLASSES

2^{de} NOMENCLATURE
CHAPITRES

3^{de} NOMENCLATURE
GROUPE

I - EXPLOITATION DE LA SUPERFICIE DU SOL.

1. Travaux agricoles . . .	1. Agriculture en général (A) . . .	1. Propriétaires cultivant eux-mêmes leurs terres.
		2. Fermiers.
		3. Métayers.
		4. Laboureurs, domestiques de ferme et autres à gages annuels.
		5. Ouvriers agricoles et autres payés à la journée.
2. Jardinage et culture maraîchère . . .		6. Horticulteurs, maraîchers.
		7. Pépiniéristes.
		8. Champignonnistes de couche.
3. Silviculture		9. Forestiers.
		10. Bûcherons, fagotiers, charbonniers.
4. Élevage des animaux de ferme . . .		11. Élevage de l'espèce chevaline, asine et mulassière.
		12. Élevage de l'espèce bovine.

Appendix 3:

Appendix D: A statistical table indicating the land and population estimates for colonized or independent African nations (IIS, 1887, 168)

POSSESSIONS DE LA FRANCE EN AFRIQUE.

A — ALGÉRIE, COLONIES ET PROTECTORATS.

Nombres d'ordre	POSSESSIONS ET PROTECTORATS		SUPERFICIE en kilomètres carrés	POPULATION	DENSITÉ de la population (nombre d'habitants par kilomètre carré)
	1	2	3	4	
1	Algérie (1886). (1)				
	Alger	Territoire civil	23 550	1 202 768	51.4
		de commandement	81 617	177 773	2.2
	Constantine.	Territoire civil	26 043	1 369 153	52.6
		de commandement	101 021	197 266	2.0
	Oran.	Territoire civil	24 613	752 554	30.5
		de commandement	61 460	117 951	1.9
	TOTAL	Territoire civil	74 236	3 324 475	44.8
		de commandement	244 098	492 990	2.0
	Total		318 334	3 817 465	12
	Complément pour le Sahara algérien jusqu'au 30° degré de latitude.		200 000 ?	50 000 ?	0.25
	Total de l'Algérie (Sahara algérien compris) (2)		518 334	3 867 000	7.5
2	Tunisie (protectorat) (2)		118 000 ?	2 100 000 ?	17.8
3	Sénégal (3)		160 000 ?	500 000 ?	3.1
4	Etablissements de la Côte d'Or (Assinie, Grand Bassam, Porto Novo, etc.) et Congo français (territoire du Gabon et de l'Ogooué) (4)		500 000 ?	6 700 000 ?	13.4
5	Mayotte, Nossi-bé, etc.		660	17 803	27.0
6	Sainte-Marie-de-Madagascar		170	7 179	42.2
7	Choc (5)		12 000	22 000	1.8
8	Réunion		2 512	172 084	68.5
9	Madagascar (protectorat) (6)		592 000	3 500 000 ?	5.9
	Total des possessions coloniales et des pro- tectorats (7)		1 385 312 (8)	13 019 000 (8)	...
	Total des possessions de la France		1 904 000	16 886 000	8.9

Appendix E: Footnotes for the statistical estimates of the countries indicated in Figure X detailing how exactly these estimates were generated and their perceived limitations (IIS, 1887, 169)

(1) Les limites de l'Algérie étant indéterminées au sud, il n'y a aucune donnée officielle sur la superficie. Quelques auteurs attribuent à l'Algérie plus de 600,000 kilom. carrés. Nous évaluons ici le Sahara algérien à 200,000 kilom. carrés en nombre rond indépendamment de la portion (environ 100,000 kil. carrés) déjà comprise dans les 318,334 kil. carrés. La population est celle du recensement de mai 1886.

Les données de détail sur la superficie du territoire civil et du territoire de commandement sont déjà anciennes et ne correspondent pas à l'état actuel pour lequel on n'a que des données générales. Ainsi le territoire civil était déjà de 100,565 kil. carrés en 1882 et il s'étendait en 1886 sur 119,203 kil. carrés; le territoire de commandement se trouvait diminué d'autant.

(2) Les limites de la Tunisie sont indéterminées au sud et par suite la superficie ne saurait être donnée avec précision. La moitié environ (soit 60,000 kil. c.) de ce territoire appartient au Sahara. Une mesure sommaire prise sur une carte d'Afrique au 10,000,000 nous a donné 120,000 kil. c. (mesure planimétrique au millimètre carré) et 121,000 (mesure des trapèzes sphériques compris entre les méridiens et les parallèles). Le nombre des habitants n'est pas connu; plusieurs auteurs le portent à plus de 2 millions.

(3) Il n'y a pas de données officielles sur la superficie et sur la population du Sénégal. Les limites sont tout à fait indéterminées. En comptant les pays protégés, on pourrait indiquer une superficie bien supérieure à celle de 60,000 kilom. carrés qui a été donnée dans l'*Annuaire du Bureau des Longitudes* pour 1887. Le calcul planimétrique sur une carte au 10,000,000 nous a donné 155,000 et 188,000 kil. carrés. Nous portons par hypothèse la population à 500,000 habitants, à raison de 3 habitants par kil. carré.

(4) La limite septentrionale du Congo français n'est pas nettement déterminée; celle de l'est qui s'appuie sur la Licoua ou l'Oubangi ne l'est pas beaucoup mieux. Un géographe allemand (*Mittheilungen von Petermann*, année 1885, p. 185) ne donne au Congo français que 448,800 kilom. carrés. La mesure prise sur une carte au 10,000,000 nous a donné 480,000 et 490,000 kilom. carrés. D'autres auteurs donnent jusqu'à 670,000 kil. carrés. Le chiffre de la population est tout à fait inconnu; le nombre 6,700,000 est une pure hypothèse, fondée sur la densité probable du bassin du Congo.

(5) La superficie est fondée sur l'étendue en longueur (200 kil. de côte) et en profondeur (60 kil.) de la concession. Le chiffre de la population n'est qu'une hypothèse.

(6) Le nombre des habitants de Madagascar n'est pas connu; celui qui est donné ici n'est qu'une hypothèse. Les mesures planimétriques prises sur la carte de Madagascar nous ont donné seulement 560,000 et 566,000 kil. carrés.

(7) L'Algérie n'est pas considérée comme une possession coloniale: elle est une partie du territoire français et elle est administrée en grande partie comme la France.

(8) La récapitulation du tableau n° 6 (République française) porte 1,285,000 kil. c. et 12,719,000 hab. parce que la superficie du Sénégal avait été évaluée, (comme dans l'*Annuaire du Bureau de Longitudes* pour 1887) à 60,000 kil. c. au lieu de 100,000 et la population à 200,000 au lieu de 500,000.

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