Knowledge of the U.S. Social Sciences, 1888–1922

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Getting Started

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Figure 1: Explore your options!

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Best,

Brooks

Knowledge of the U.S. Social Sciences,

1888–1922

Abstract

Knowledge development of journals is measured as the change in topic prevalence over time.

Keywords

sociology of knowledge, topic modeling, history of social science

Chapter 1

Introduction

What were the ideas that predominated in the social sciences at their formation as professions in the postbellum United States? What was the course of their development over a generation of scholarship? In this study I will answer these questions inductively through a reading of the original journals in each discipline. Though the goal is substantive, the methodological challenges of consuming a large quantity of text will feature importantly in the story that unfolds. Along the way I will demonstrate the usefulness of the computational *distant reading* that is being explored in the humanities and how it can be combined with traditional textual analysis for social science purposes. While controversial in humanistic circles that emphasize the primacy of the reader's novel interpretive work when consuming text, distant reading fits comfortably within a social science epistemology that aims to achieve an objective description of intellectual history. Indeed, computational methods offer a useful backstop to the idiosyncrasy of a particular person's reading of history.

Computational textual analysis promises to automate a particular slice of what hermeneutical methods accomplish. Hermeneutics claims that through historical methods it is possible to reconstruct the interpretive context of texts such that they can be understood in the same way that contemporary historical actors understood them. Establishing such context is a laudable yet arduous feat of historical research to uncover the social and intellectual milieu of a particular text. This is the gold standard approach, but one that restricts the field to specialists with the training and resources necessary for the undertaking.

Computers cannot study history in this way. What they can do, however, is mine source material for limited kinds of contexts. The kind I am concerned with below are the *historical vocabularies* that writers used to construct texts in historical time. Vocabularies are glyphs without grammar; they do not mean anything, but nothing meaningful can be said without them

in the present or in the past. They are the mediated form of language, and in communicating with each other historical actors leave traces that survive perfectly in time so long as texts themselves survive.

While computers cannot read meaning in texts, and can barely recognize it, they are almost as good as humans at recognizing the glyphs of texts, and vocabularies are nothing but glyphs. What computers lack in smarts, they make up in speed and memory. The quantitative scale of their recognition makes for a qualitative shift in that vocabularies can be enumerated across immense corpora of texts. Immense, at least, by human standards as there are limits to even computer memory and speed. Yet such enumeration of texts into objective historical categories; this is a profound resource for the intellectual historian. That one could begin a reading with such context would be a transformative research tool. Vocabulary enumeration, by which I mean simply the counting and classifying of texts according to the vocabularies they contain, invites a population studies approach to intellectual history. Where sense-making is driven by comparisons, a reader's arbitrary combination of texts is guaranteed to lead to anachronism. But if we can know that texts are relevant to each other without knowing why, we have done some small amount of hermeneutical work by supplying texts as historically correct context to each other.

And even going so far as abandoning the project of reading texts in a historically correct way, vocabulary enumeration can still lend objectivity to a novel construction, a productive anachronism, of textual meaning. Because vocabularies, the problems solved by computers, are mathematically, algorithmically, or stochastically determined, they may provide an immutable description of corpora that, like a map, enables individual and collective exploration within a common framework. Such maps may become the parameters of interpretive methods, which we may use to surface and control some of our subjectivity.

This at least is the rationale for what follows. I begin with a discussion of intellectual history of two social sciences, anthropology and sociology, in the United States. I take a coarse view of national history as the history of wars because of their downstream effects on government activity and institutional investments. The first period is between the end of the American Revolution (1783) and the end of the American Civil War (1865) and is the national context for the origin of U.S. anthropology. The second period is after the Civil War until the end of World War I (1918) and is the context for the origin of U.S. sociology and of modern U.S. higher education generally. Wars of territorial expansion are waged regularly during both periods against native peoples and rival colonial empires, and social research was always recruited to solve attendant problems of population and to provide rationales for the relationships with and understandings of conquered or would-be conquered people.

I use intellectual histories of anthropology to characterize the prebellum period, and the same for the postbellum period including sociology. The most important journals in each field date from the postbellum period, and the appearance of each

is implicated in the project of professionalization for each discipline. The 1920s marked the end of war with the last of the militating American Indian tribes, and a reckoning with the darkest sides of industrialization laid bare by WWI. Social research had by this time completed a shift from colonial to industrial problems and enjoyed a golden decade of development as a profession, punctuated by the next great historical crisis in the Great Depression. With the 1920s begins the adolescence of social research, which is beyond the present scope. This study is of its childhood, which ends with the Great War. I however draw the study out until 1922 because it is the end of the public domain in U.S. copyright, to aid in the reproducibility of the analysis and so that all readers may recover the texts in question without difficulty.

1.1   Topics $\overset{?}{=}$ Ideas

The strategy of the following analysis occurs in four steps.

1. Sort text into categories of similar vocabulary.

2. Describe the vocabularies that define category membership.

3. Describe vocabulary prevalence across time and discipline.

4. Validate category contents by a traditional qualitative reading of texts.

Steps 1-3 constitute a normal approach to quantitative intellectual history, whereas step 4 is seldom attempted. If in this way we may operationalize the notion of cultural meaning or cultural logic as conformity to vocabularies, then a new horizon of intellectual scholarship is possible that would allow a so-called "distant reading" of texts. If on the other hand we find that machine learned vocabularies do not correspond to human learned understandings of the texts drawing on those vocabularies, then we may in fact discover that distant reading is not a scientific, historical, or hermenuetical method, but rather a new humanistic method of reading texts de novo.

A population study of ideas at a societal scale has never been conducted in the social sciences.

Topic modeling refers to a variety of approaches to the statistical modeling of texts that blurs the distinction between qualitative and quantitative analysis. Texts are merely collections of terms (usually words) that are counted, and such counts may describe a text. In the same way that a civil census reduces communities to counts of the people who live in them, topic modeling reduces texts to a count of words, to diction. And just as a census of people fails to capture the nuanced interactivity of human settlements found in their culture, politics, and economic activity, the meanings and intentions behind words are

washed away. At a very general level this term census paints a lexographic picture of texts, analogous to the demographic picture gained by a survey census of cities and towns. This approach to document description is sometimes called a "bag of words".

To explain the contents of the bag-of-word, topics are proposed. Topics can be thought of as catelogs out of which words are ordered and placed into the shopping cart that is the document. Different catelogs, different word availabilities, will produce different documents. The final bit of inference that makes topic models so practically useful is the idea that documents may be composed of multiple topics.

The surprising qualities of texts are explained to be how authors draw on regular and commonplace topics to say something different.

Chapter 2

History of Ideas

Though the intellectual history of the social sciences begins well before the Civil War, the current epoch of its institutional history, the epoch of professions, becomes possible only in the postbellum period. Before the Civil War, social research was a skilled occupation, and individual researchers found patrons through government and civil institutions supporting pursuits of knowledge, such as the American Philosophical Society (APS) founded in 1743 in Philadelphia. One of the great consequences of war was renewed federal investment in nation building in its aftermath. Some Union congressmen saw the rebellion as a failure of education, prompting the creation of the U.S. Department of Education in 1867 to strengthen nation building. In the postbellum period both anthropology and sociology develop as professions due primarily to the growth of universities as a new context of their activity. Without universities, social research would have remained an occupation in need of clientele. With them, social research develops the resources enabling relative autonomy, self reproduction, and occupational closure, the hallmarks of a profession. This study seeks to examine the period of transition after the Civil War from social research as occupation to social research as profession.

2.1   Prebellum Social Research 1783-1865

U.S. nation building had continued since the end of the American Revolution and had enrolled researchers in the projects of westward expansion against native peoples, the consolidation of slave economies against Africans, and the legitimation of the American experiment against European detractors. These were pressing problems to the intellectuals among government leaders at different levels, and they worked to make investments in new knowledge to resolve them. Such new knowledge was

initially an extension of older "theories of man" in theology and enlightenment natural philosophy, which had a foothold in the private education of the American so-called natural aristocracy as well as in urban colonial institutions like the APS serving as meeting places for intellectual elites and scholars. After the British burned the Library of Congress in 1914 Thomas Jefferson famously sold his personal library to Congress to restore it, an illustration that secular arts and sciences were produced and maintained by and under the patronage of private elites.

The "theory of man" in the colonial period was that historical progress played out along a scale from savagery to barbarism to civilization, and that movement in the direction of progress was a function of time and innate capacity. European societies of the Old World had the best endowment of each, for they were very old (seen as continuous with pre-Christian antiquity) and were lead by aristocracies and monarchies representing the highest human capacities. Conversely colonized peoples, and colonial societies themselves, were understood to suffer low endowments of both, developing slowly due to their lack of morality, reason, and aesthetics and having had less time to achieve what little progress they could.

To gain parity with their colonial masters, the American elite altered the theory to emphasize capacity over time. Because all men were equal, the Americas could achieve greatness meeting or surpassing Europe given independence and opportunity. Their masters scoffed at the idea that a colony could ever "catch up" to the development of Europe, with aristocratic families charting their roots into antiquity. American elites, especially Southerners like Jefferson, saw themselves as naturally superior to their countrymen, taking an aristocratic role in their own country, but not requiring the ancient lineages qualifying aristocracy in Europe. The values of the Declaration were egalitarian only in this limited sense of parity across civilizations.

Egalitarianism did not mean parity within civilizations. Colonial theologians, philosophers, and learned elites had long provided the intellectual rationalizations of the domination of women and the environment, and such reasoning was readily exported to the yet unresolved problems of native tribes and African slaves. Paradoxically egalitarian values reinforced rather than ameliorated supremacist ideologies at home. If all men were equal, and natives (or Africans, or women) were clearly inferior, then natives must not be men. The racism of the Old World order in which hierarchy and domination were natural and unproblematic, was also a consequence of egalitarian values but for different reasons. Such racism was indeed more pernicious in America as the concept of equality invited even more ardent "proof" of the inferiority of dominated peoples.

American intellectuals knew the same logic of inferiority could be applied to the American elite who if they could not match the rate of progress of European society would be judged a newly diverging and potentially inferior race of men. Though it did little to ameliorate white male supremacist thinking, the contradictions between the universalistic and egalitarian values

expressed in the U.S. Constitution did occasionally create grist for academic debate leading to some investments in research critical of extant racist typologies. In Europe scholars of comparative languages charted the supposed common origins of European cultures and the time it had taken them to diverge. This inspired Jefferson to patronize ethnological research on the languages of native tribes in America. He had by 1785 amassed enough data to appreciate their diversity, which he took as evidence that New World cultures may be older, and therefore more developed, than commonly assumed by colonizers.

The egalitarian-for-its-time thinking of Jefferson did not contravene racism, but it did provide a different model of racial hierarchy, which could be consequential for government projects. Jefferson thought that if all men are equal, that they share the same human capacity for progress, then native people had merely not had the time to develop and discover progress for themselves. They could and should be taught, especially to abandon hunting in favor of agriculture. For a brief time in the 1840s the Virginia legislature used tax incentives and educational programs to promote intermarriage between male settlers and native women with the goal of accelerating the natural development of native culture. (Patterson, 2001, 9) Such experiments were short lived, as the predictable backlash was that such mixing would risk lowering white culture rather than elevating Indian, and genocidal and segregationist policies won out. Thus while all racial models concluded with the domination of natives by settlers, different models of racial hierarchy sewed policy disputes within colonial leadership.

The role of social research then was to be in service of either government or private political associations. Careers were made for anthropologists in patronage relationships to generate knowledge to aid nation builders.

2.2 Postbellum Social Research 1866-1918

While the roots of anthropology are as old as the republic, sociology did not develop in earnest until after the Civil War.

Chapter 3

Four Fables

What were the dominant ideas at the genesis of U.S. social research? How would we know them if we found them? I consider two sets of approaches, the first methodological (how?), and the second ontological (what, why?), which will help orient us to the plan of the study. I will briefly describe a version of the familiar distinctions among qualitative and quantitative methods on one hand and nomathetic and idiographic ontologies on the other. What is new is the question of whether computational text analysis may blur the lines between these classic social science epistemologies.

3.1   Method *or* The Tortoise and the Hare

Methods are procedures for arriving at results, and they act by exposing assumptions to empirical observations. They provide a source of influence on arguments that breaks the circularity of their reasoning. Methods differ in the amount of material exposed to the observer and the speed of its exposure. The difference between human and machine learning concerns both, but speed is especially salient.

> "You may deride my awkward pace,
>
> But *slow and steady* wins the race."
>
> – Robert Lloyd (1762, 38)

Lloyd's creatures correctly describe the consequences of haste.

First consider a humanist, a historian, a scholar with sense enough to read primary source material. How would she proceed

to conduct an intellectual history? Slow and steady, a tortoise would identify diverse documentary sources allowing her to collect the names of important people and organizations and learn what she could of their biographical facts and event timelines. She would then read the scholarship both produced and consumed by these important actors. The identification of ideas would be the most difficult of her tasks, not just because reading takes time and effort (and there would be much of it), but because ideas exist in the minds of people and leave no direct empirical trace. The interpretation of writing in a historical context would suggest candidate ideas; their prevalence across time and place would indicate their historical importance. It would be tedious work requiring intelligence and patience.

Next consider a sociologist, a computer scientist, a librarian awash in books with no time to read them. She would identify a convenient source and ask a computer to do the rest. Hasty, impudent, and lacking the tortoise's fortitude and patience, a hare uses a mental prosthetic to achieve and perhaps exceed the scale at which a humanist can consume documentation. She learns much less than the tortoise because, whereas people can find what they were not looking for, machines can learn only what they are told to learn. She fails in the test of knowledge (of course we know who wins in the end), but at least she fails quickly.

For shorthand, we can refer to these two approaches are Aesop's tortoise and hare, the humanist mode and the computational mode.[1]

3.2   Ontology *or* The Fox and the Hedgehog

So we might learn more slowly or less quickly, but what will we be trying to learn, and why? These concerns the question of ontology. Ontologies are categories of being, or more simply, they are the assumptions that answer the (usually implicit) question, "What is this?". Ontologies may be descriptive categories of classification or explanatory causal mechanisms. It is neither possible to describe nor explain without making onotological assumptions.

"The fox knows many things,

but the hedgehog knows one big thing."

– Isaiah Berlin(1953, 1)

Here two of Berlin's creatures will help show two different ontological approaches.

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[1]The tortoise may just as well be a hammer, and the hare a steam drill, but for the fact that the hammer ended up losing his contest.

Third, consider a surveyor, an ethnographer, a data scientist. A fox believes that the world is nothing but the facts about it. She sets out to learn something about everything, and in so doing she tends to locate where the action happens to be without having known it was there to begin with. Though she can only skim for surface features, a fox's shallower understanding of many things is usually very helpful. A fox learns where the important, useful, or interesting things in the world are hidden.

Fourth, consider a theorist, a statistician, a case worker. A hedgehog learns something, but not necessarily everything, about something. They know less than a fox, but if they are a good hedgehog then what they know is good enough. A hedgehog experiences the world in filtered fashion, bothering to remember only what contributes to her system or her obsession.

So let us run Aesop's race again, but make it a three-legged race competing in teams. And to add some purpose above crossing the finish line, the party set an objective. The teams must gather fruit to bring back to the table for supper. Who would win? Hare and hedgehog of course, for they knew a big melon would provide more than their share, which they found at a farm stand down the road. The real contest was for second place. Hare and fox set out at once to forage, darting furiously here and there to gather a great assortment of wild nuts and berries. There were many mouths to feed and each morsel was small, so they had to be dedicated to growing a larder. Tortoise and hedgehog heard tale of a durian, the spiked and malodorous king of fruits, and thought it fit well with hedgehog's general motif; but they did not sell them at the country market so they walked into town looking for an importer. They returned at sunset, durian in tow, to find hare and fox laying exhausted atop an impressive heap of produce that hare and hedgehog had clearly been snacking on while they idled the afternoon away. Sadly tortoise and hare never even placed; they had thought it prudent to plant a garden of their own and left for the seed store with no intention of returning to the party. In a few years time they intended to be the life of the potlach.[2]

3.3   Plan of the Study *or* A Three-Legged Table

So in four corners of a table, three were full of different produce and in one lay only a promise.

Table 3.1: Fable Table

	⍰	⍰
⍰		
⍰		

Understanding differences in the ontological status of the "topic" concept is a good way to begin to understand how this

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[2]Tortoise and hare had recently fallen out with ant and grasshopper, requiring them to find new friends.

method of analysis is used by researchers.

Analysts have conceptualized the use of topic models in very different ways. Some researchers treat topics as useful for a particular purpose and not as true descriptions of real phenomena. Topics as information enhances the ability to search for relevant documents or statistical trends in otherwise unwieldy corpora as a time-saving alternative to manually reading large collections. (Boyd-Graber et al., 2017) Empirical problems, used as demonstrations of statistical techniques, have included

"One's own consciousness dances about upon the words like a will-o'-the-wisp."
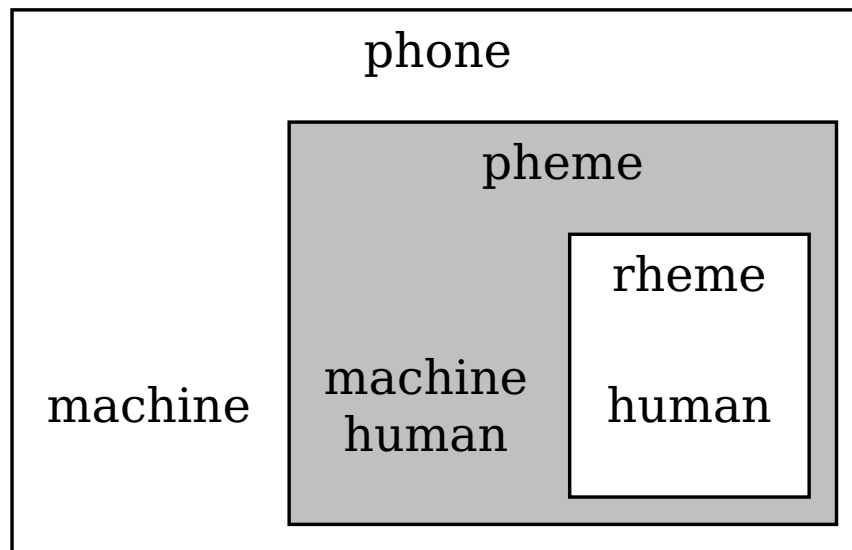
–Niklas Luhmann (2002, 166)

Figure 3.1: Ontological Approaches to Topics

This is the "needle and haystack" approach favored by computer and information scientists who tend not to be interested in theoretical intepretations beyond the statistical definitions of topics.

Other researchers instead grant topics ontological status, and these can be divided into three types. Most ambitiously, topics may be treated as representing categories of thought. Latent semantic structure latent semantic structure (**?**) representational style (Grimmer, 2016) frame (DiMaggio et al., 2013)

Text as thought, or as communication. Thought holds that the ideas can be reliably interpreted, perhaps hermeneutically,

to recover the mental events or intentions of authors and readers. Ambitious. Easier is to treat texts as communications, as messages, and worry little about their meanings or interpretations. A study of communication is a good foundation for the study of thought, but it is a separate task and the one we undertake here.

Chapter 4

Data

Computational text analysis requires that text corpora be transformed from a human to a machine readable format. Several efforts to digitize paper archives have made historical research designs possible, notably the Google Books project, HathiTrust, and ITHAKA JSTOR archive. Digital storage devices like the portable document format (PDF) have also enabled texts to be represented in both a digital version and as a reasonable facsimile of paper originals. Reasonable, we should say, for most sociological purposes, put not for other historical questions where materiality of culture is important. (Schreibman, 2014, :149)

Digital archives make research into the production of culture difficult, precisely because they misrepresent several aspects of the means of production. Because researchers should be mindful that digitization of texts abstracts some qualities of texts and renders many others invisible. The importance of physical space and material qualities of libraries is illegible when working with digital archives, while the verbal content of texts is highlighted. We must keep in mind that we are not viewing what historical actors saw. Digital texts are almost perfectly fungible, while, variability in historical texts. We are liable, for instance, to underestimate the search costs to locate texts, and the fungibility of texts themselves.

There are reasons, however, to believe that digital text archives provide not just a useful but an historically valid abstraction from the material texts. If we want to understand how an individual scholar understood a particular text, better to have her personal copy, margin notes and all. Yet how would that scholar have treated the text as a cultural item? She would abstract her own copy to a format credibly held in common, the more aniseptically clean version that we see in digital archives. These are the ghosts of the texts, so to speak, but they are what would be left when all idiosyncracies were removed, the version that

one would assume colleagues thought of when declaring that text publically.

This is by way of saying that the texts I compile below are not the same that were read by the historical actors under consideration. They are the texts that historical actors would assume their contemporaries were reading, that is, the sanitized, fungible, original published form of the text. By getting at these texts, we are getting at the real historical infrastructure for scholarly communication.

The optical character recognition that computers require in order to store text digitally depends critically on the hard work of creating quality scans of journal archives. JSTOR has done a comendable job of this. Next we will describe what the JSTOR archive has to offer.

4.1   Social science journals

We rely on the JSTOR digital archive which gives access to optical scans of historical journals. The coverage of journals in the archive is very complete for those journals chosen for the database. As of this writing JSTOR contained 4,162 journals organized into nine superdisciplines.
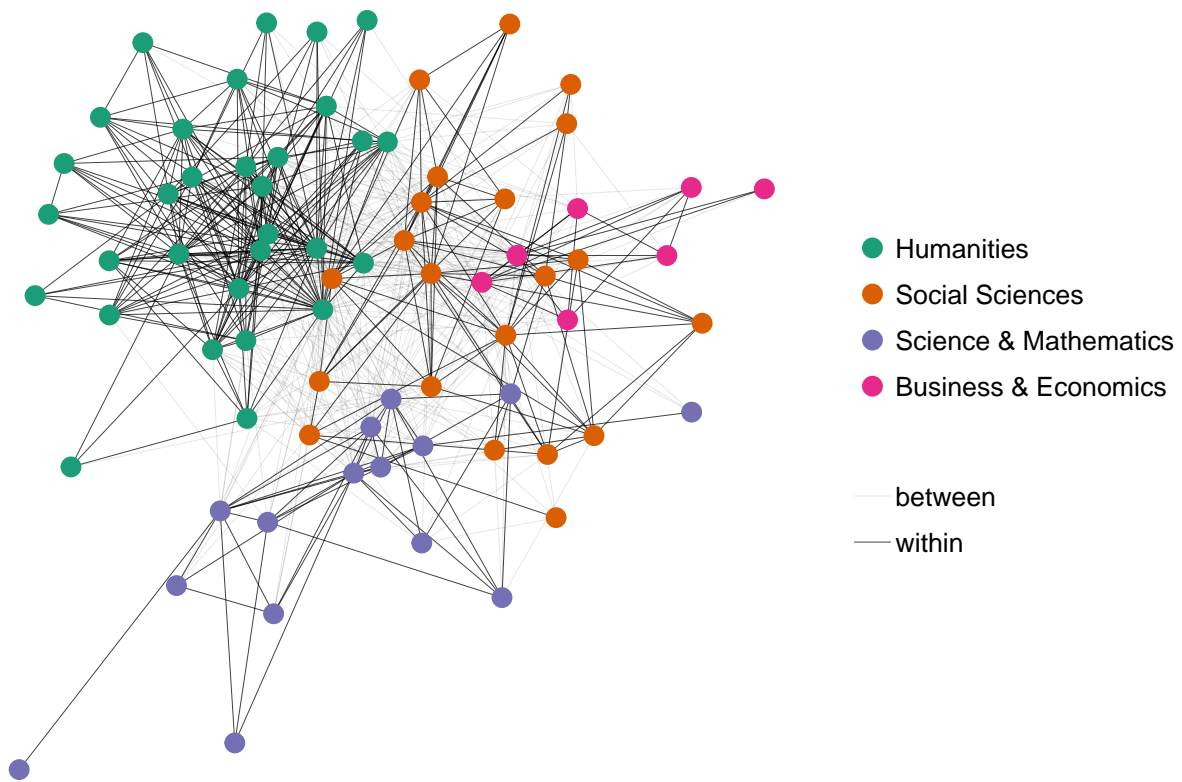
Figure 4.1: Discipline Network

Table 4.1: JSTOR Journal Counts

Superdiscipline	N	Pct
Social Sciences	3017	40.4
Humanities	1452	19.4
Area Studies	1097	14.7
Science & Mathematics	785	10.5
Business & Economics	546	7.3
Arts	413	5.5
Law	91	1.2
Medicine & Allied Health	65	0.9
Total	7466	99.9

Social science journals are overrepresented due to JSTOR's initial focus in that area. The journals within social science cover three different subdisciplines.

Table 4.2: JSTOR Social Sciences Journal Counts

Subdiscipline	N	Pct
Archaeology	680	33.3
Political Science	514	25.1
Education	382	18.7
Sociology	376	18.4
Anthropology	46	2.2
Population Studies	26	1.3
Geography	18	0.9
Transportation Studies	3	0.1
Total	2045	100
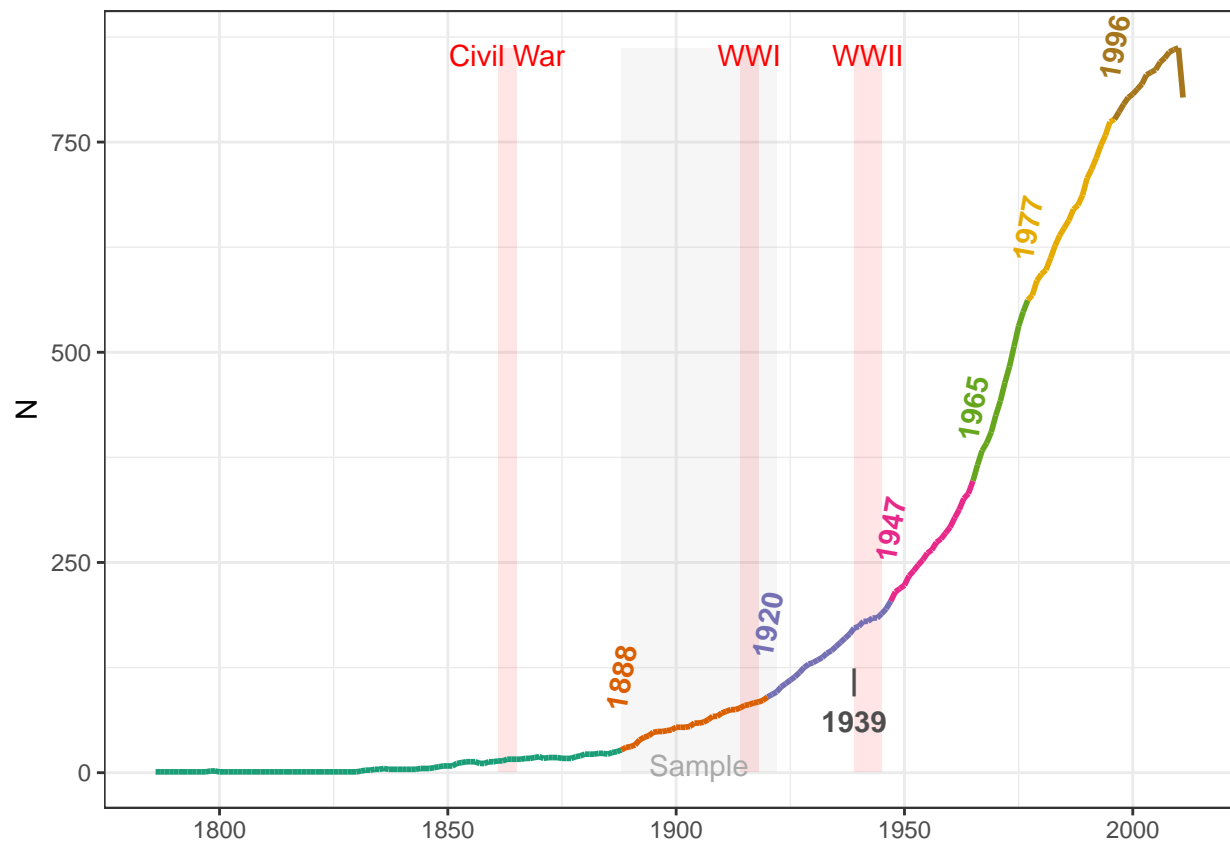
Figure 4.2: Periods in the Growth of the Number of Social Science Journals in the JSTOR Archive
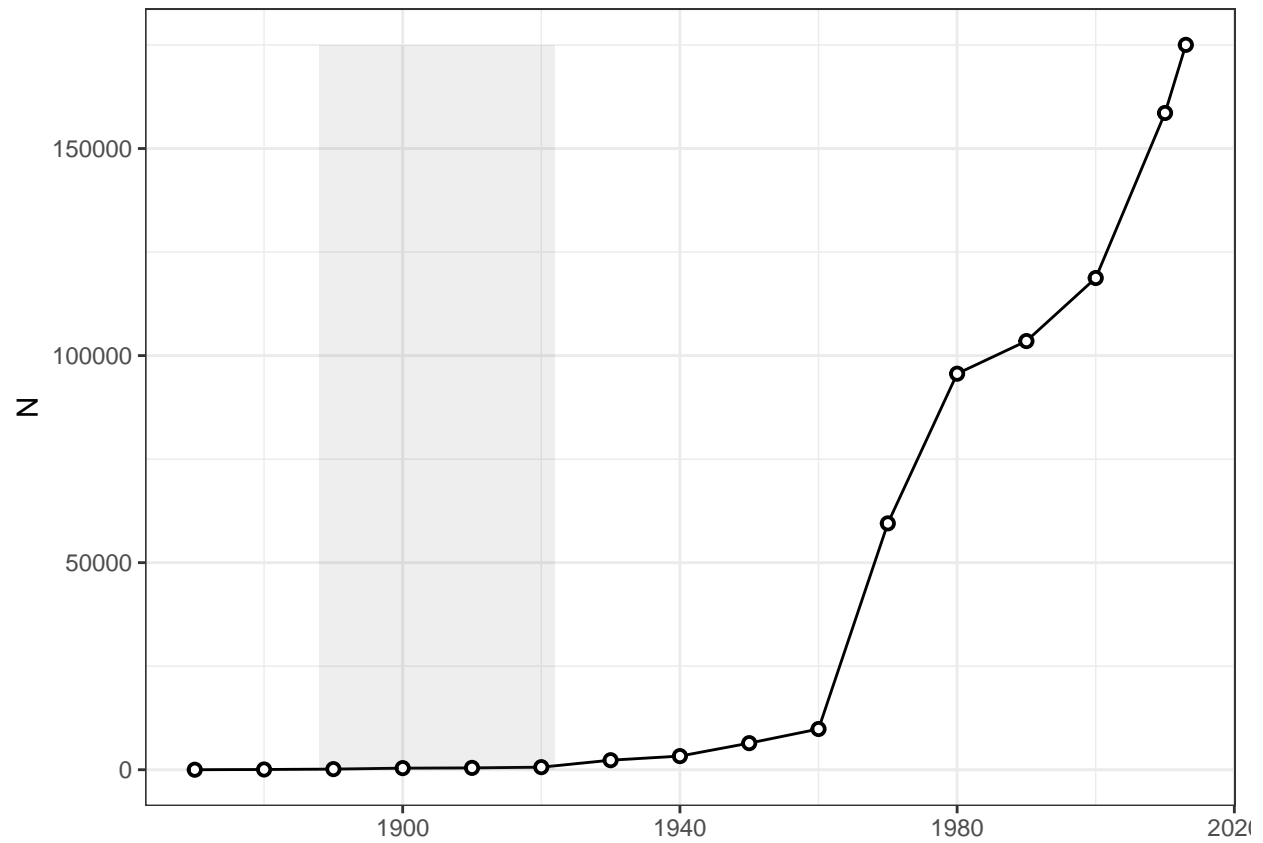
Figure 4.3: Decennial growth in number of PhD degrees conferred in the U.S.
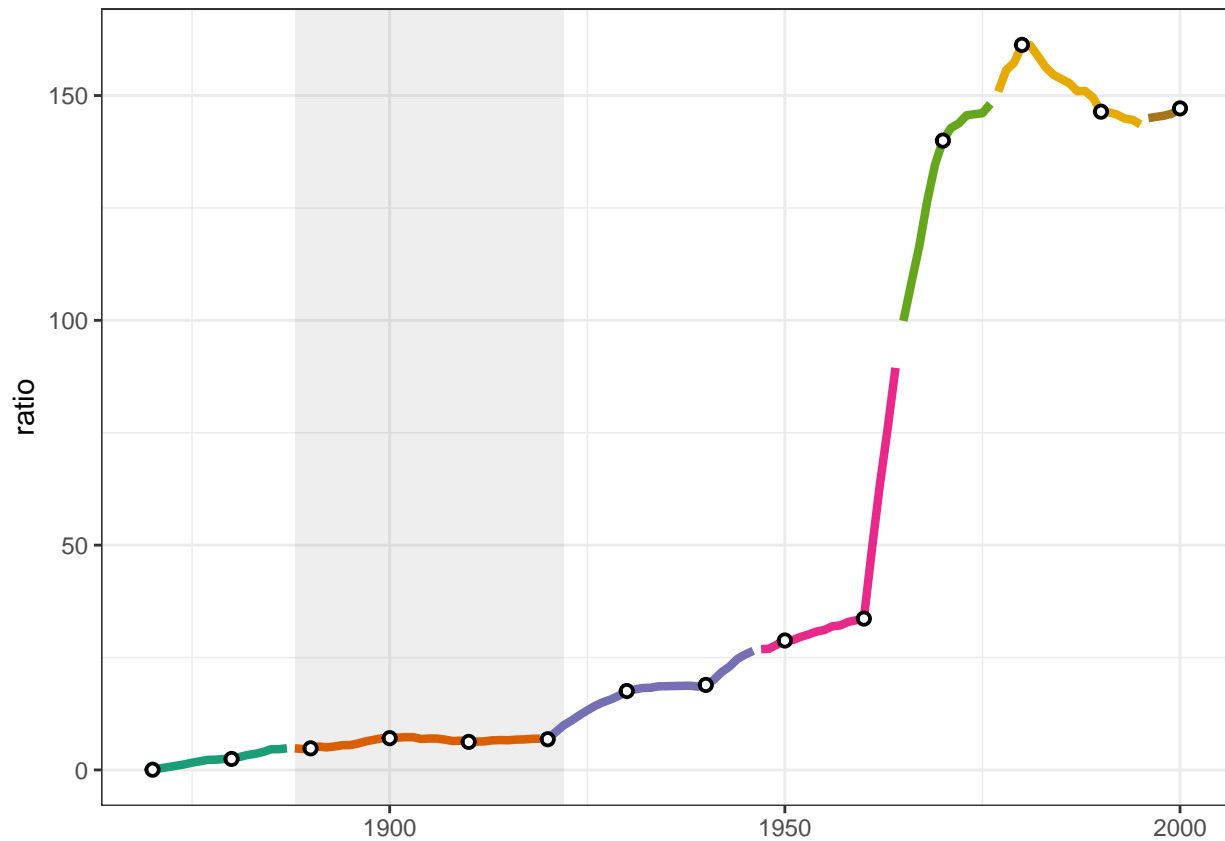
Figure 4.4: Number of PhDs conferred in the United States per Social Science Journal

This period represents one of stable growth, as the size of the field grows with the number of players on it. Between 1888 and 1922 there tended to be about seven new PhDs in the U.S. for every social science journal even as each population grew year over year. These growth patterns begin to diverge around 1920 as a decades long acceleration of personnel begins, relatively slowly between 1920 and 1960 at an average acceleration rate of 22 PhDs per journal per year, and then quite precipitously in the 1960s at an average acceleration rate of 121.

4.2   JSTOR archive

Every record for every journal was downloaded manually, including front and back matter, articles, and book reviews.

Table 4.3: Filtering due to Data Management

step	doc	pag	par	sen	tok	ter	lem
imported	5444	47596	232085				
cleaned	5404	46742	156684				
preprocessed	5404	46647	156298	747655	8436017	116841	31963
sampled	100	743	2714	11731	123203	16169	6668

4.3 Sampling

4.4 Units of Analysis

Conventionally researchers feed entire documents into the construction of term frequencies. This method treats any term in a document as being related to any other term by the same degree. The goal of any topic mixture model algorithm is to sift these terms into different topic categories basically by looking for clues across documents; a topic can be "seen" in a particular document to the extent that other documents include that topic and *other* topics different from the focal article, so that the intersection of terms reveals the topic. But a much simpler assumption to reduce the attendant noise within a document is to merely feed lower level syntactic structures–paragraphs and sentences–to the algorithm. We will see that doing so greatly improves the usefulness of discovered topics.

The irony of this approach is that while topics become more clear as documents become shorter, the assignment of any particular shorter document to a topic is murkier due to the smaller word count.

Long documents will contribute more text to the corpus, but this is fair as they make up more of the population of text. Thus a simple random sample will allow better descriptive statistics. I sampled at the paragraph level because.

Chapter 5

Modeling

The modeling objective is twofold, to sort text into categories of similarity, and to describe the qualitative content that defines

the category membership. In this way we may operationalize the notion of cultural meaning or cultural logic as the rules of

category classification. reduce expressions as instances of a latent category of expression.
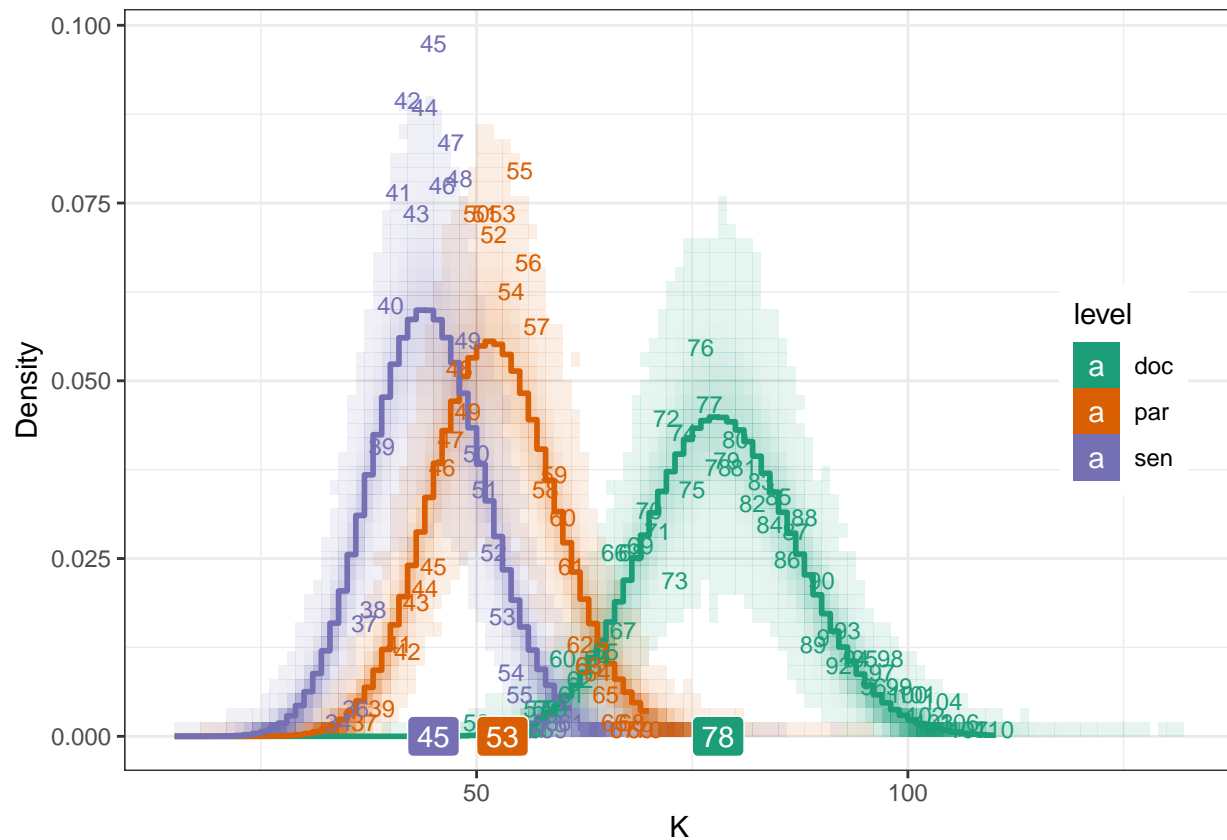
5.1   How many topics?

Figure 5.1: Distribution of K by convex hull

Table 5.1: Kurtosis Permutation Test

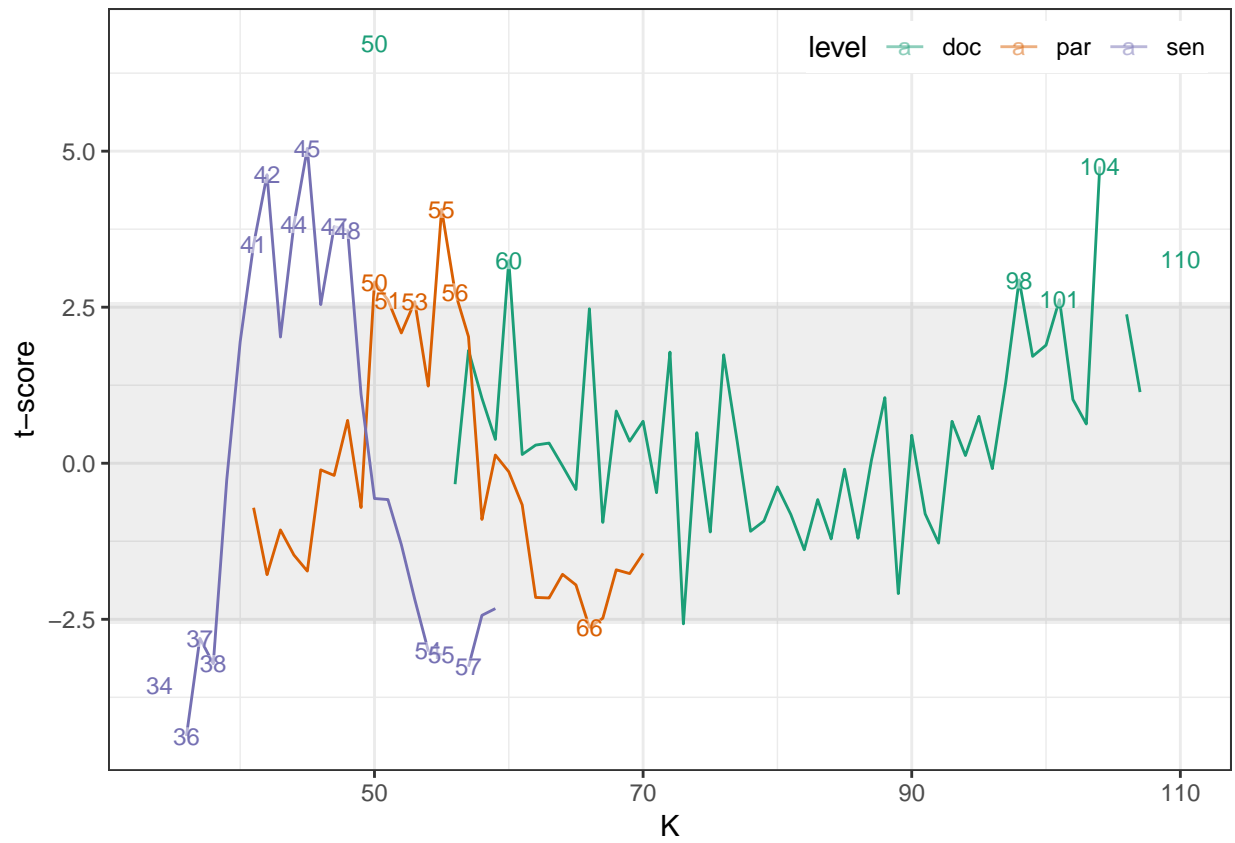| level	e	se	l99	u99	P(e $\leqq$ 0)
doc	-0.0932	0.1149	-0.3682	0.2252	0.7948
par	-0.1125	0.1206	-0.3999	0.2185	0.8257
sen	0.0118	0.2304	-0.5078	0.6471	0.4973

Figure 5.2: Significant Counts of K

5.2 Model selection
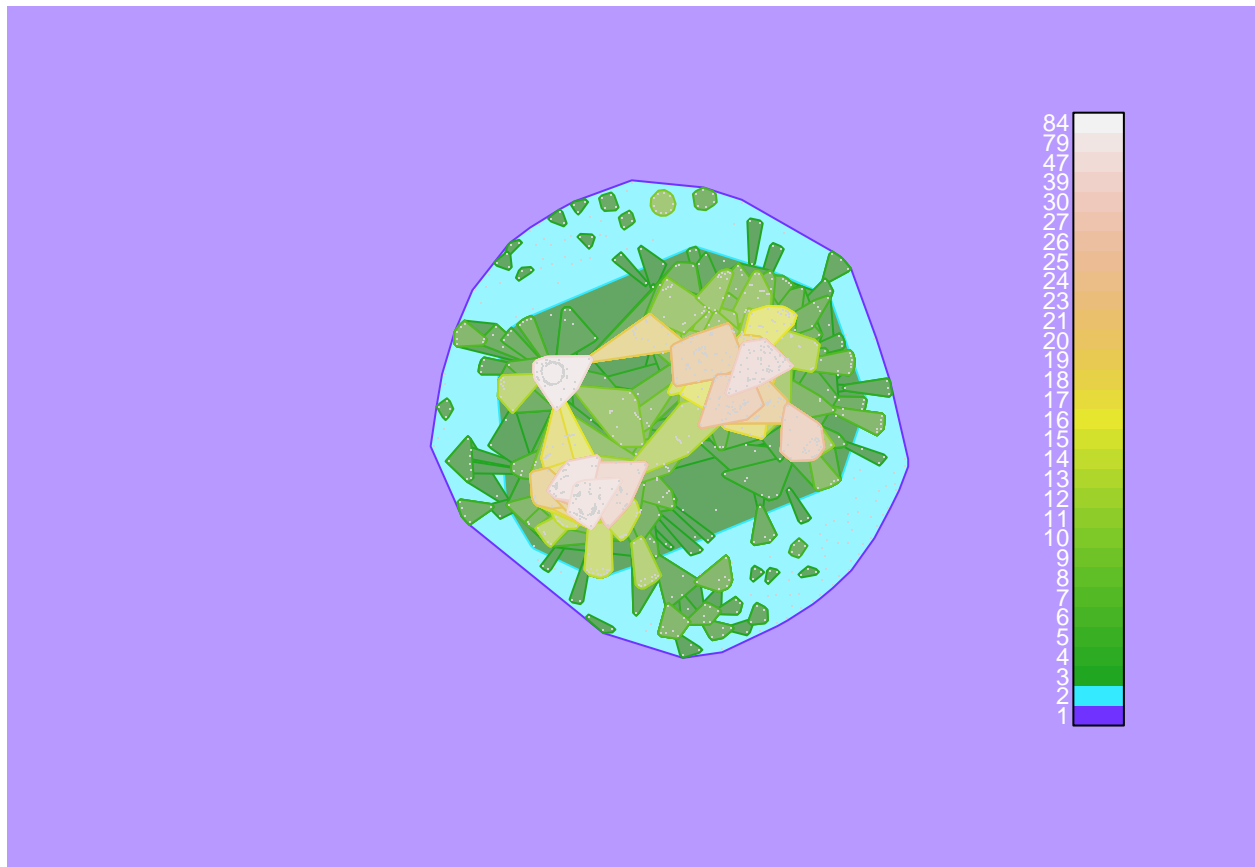
Chapter 6

Web of Knowledge

Figure 6.1: K-clique Community Island Plot

Chapter 7

Making Sense

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