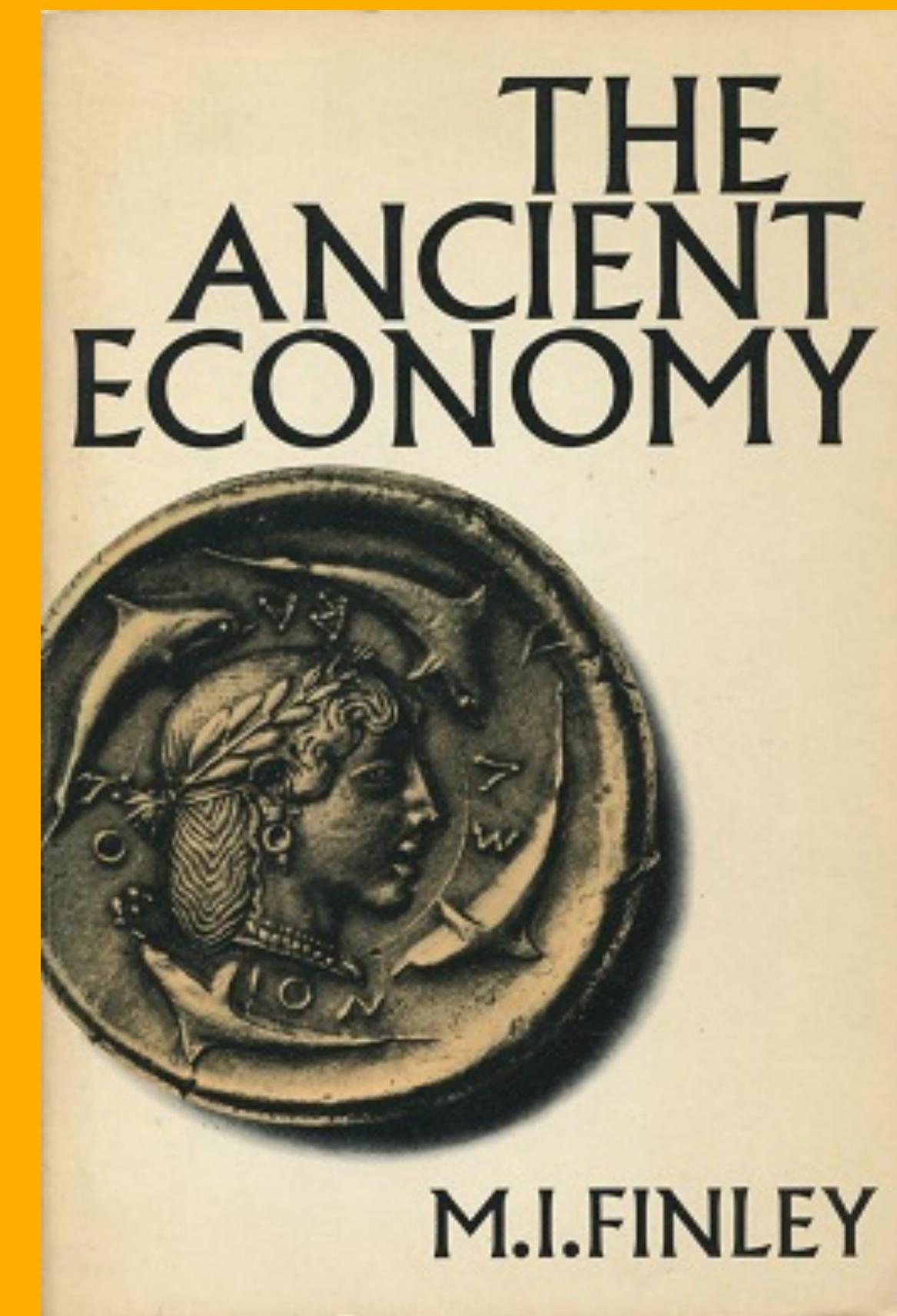


Textual Analysis of Slaves in The Ancient Economy

John Glendenning

The Ancient Economy



The Ancient Economy

Finley's assertions

1. Slavery was institutional, but not economically rational in modern terms

- Slavery was part of cultural fabric of the Roman world.
- Status symbol, not economics.

2. Slavery was conquest, not market demand

- Based on warfare and expansion not based on a supply-demand.
- Slavery widespread and entrenched.

3. Slavery did not create a self-regulating labor market

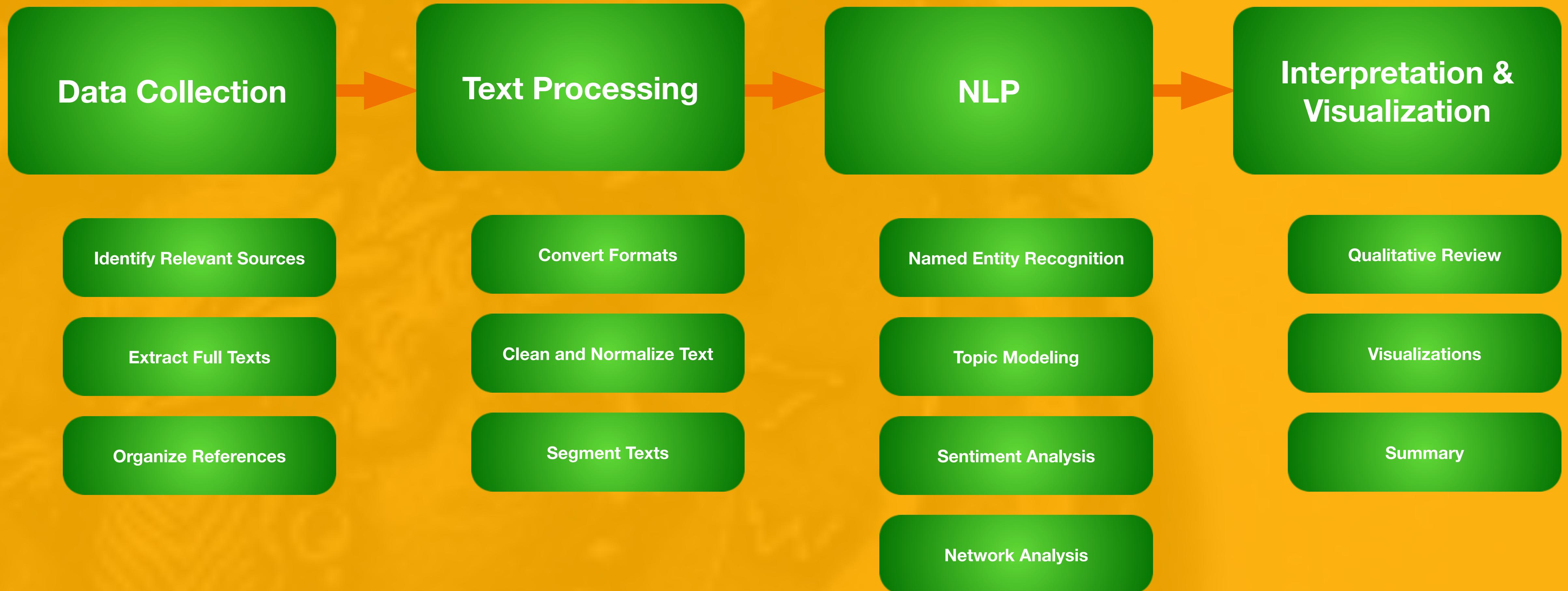
- Rome did not have a capitalist-style labor market.
- Slave labor was not priced to reflect any market logic.

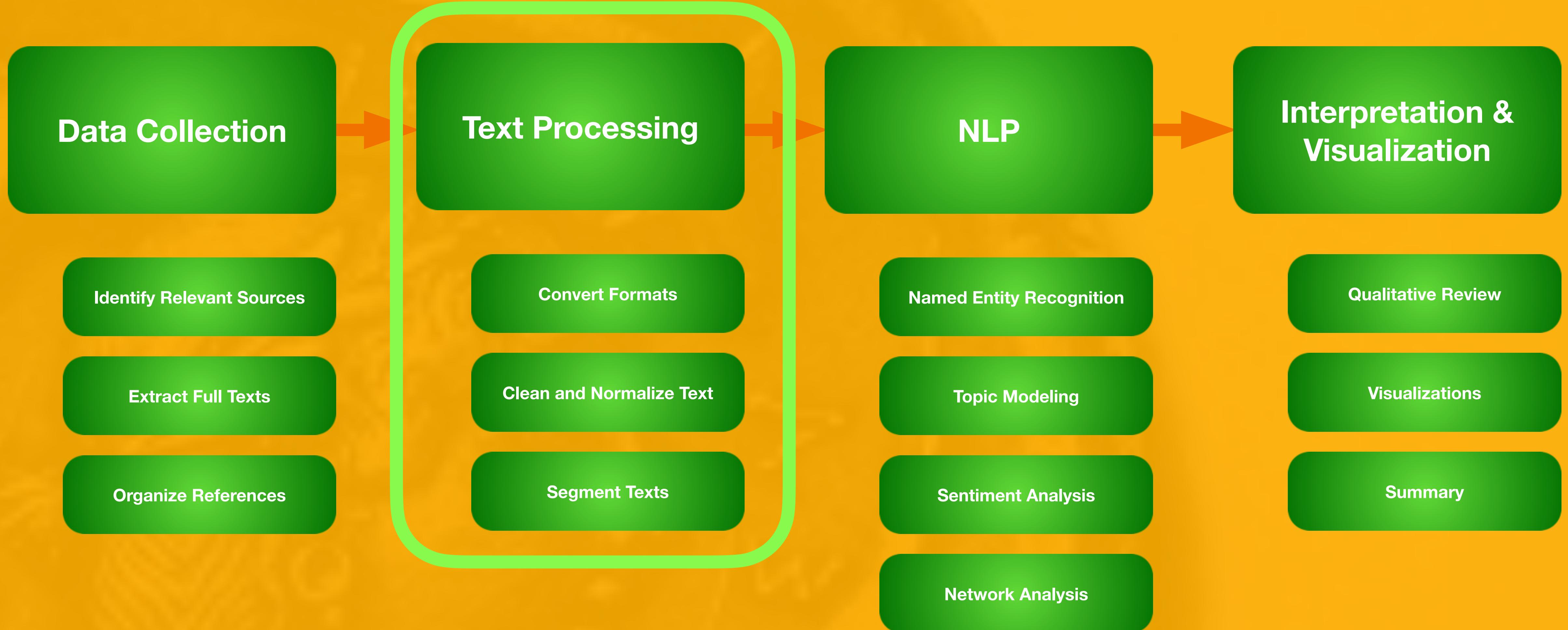
4. Slavery coexisted with household and small-scale production

- Most activities were agrarian and household based.
- Slaves did not produce for distant markets.

5. Economic activity was embedded in social structures

- Slavery is only understood in its legal, moral, and cultural contexts.
- Slavery was part of the hierarchical networks of power and patronage.





As with many aspects of our understanding of Rome's imperial diaspora, this downplaying of land in the diaspora's economy has no linear historiography. Instead, three separate factors have contributed to it, which can all now be called into question. First, while the Latin *negotiantes*, a word often found in relation to members of the diaspora, has commonly been thought to connote bankers and traders, there is now an ever-growing set of arguments that in the late Republic the word had a very broad scope, including landowners.² Second, in the Greek East the paradigmatic status of Delos has contributed to seeing diasporic Italians as bankers and traders.³ Such a status, however, cannot be assumed, it must be proven; anything else would simply mean being seduced by the wealth of evidence from the site. What is more, Italians on Delos did demonstrably own land there.⁴ Lastly, Moses Finley's insistence on the incompatibility of landowning on the one hand and commerce and profit-seeking on the other, has also played a part in sidelining the rôle of land in accounts of the economy of the Italian diaspora, a group of people thought to be mainly concerned with *lucrum*.⁵ hence the suggestions that members of the diaspora purchased land to gain social prestige or that social élites would have turned over their land to tenants, receiving rents from them.⁶ While many aspects of Finley's argument have come under attack, the static nature of the model he formulated has turned out to be its weakest aspect.⁷ Today the greatly variable nature of the exploitation of natural resources in Greco-Roman antiquity is well-recognized.⁸ Together these three arguments have clearly undone the assumptions on which the prevalent interpretation of the rôle of land in the economic profile of the Italians was based. Indeed, recently scholars have begun to imagine a possible 'interdependence of their "landed" and "commercial" interests'.⁹ The place of land in the economy of the diaspora thus now appears as a research problem waiting to be investigated, and this is the question that we propose to tackle in this article.¹⁰

Focusing on the Greek East, where evidence is most plentiful, we argue that more Italians owned agricultural and natural resources in the provinces than has previously been recognized, that these Italians were particularly interested in producing high-end goods, and that they were involved in commercializing their products, exporting them to, among other places, markets in Rome and Italy. These Italians thus played a crucial

Land as afterthought, unconnected to commercial interests: e.g. Frank 1933: 387–92; Alcock 1989: 8; 1993: 74–6; Rizakis 2002: 123. Land mainly resulting from defaulting debtors: e.g. Brunt 1971: 213–14; 1988: 169–72; Cassola 1970–71: 307, 310–11; Sartre 1995: 154, 277. Land acquired for social prestige: e.g. Wilson 1966: 160; Brunt 1988: 163; MacMullen 2000: 5; Zoumbaki 2014b: 192. For these Italians as a 'diaspora' see Purcell 2005: 85.

² Nicolet 1966: 358–9; Wilson 1966: 4–6; Brunt 1988: 168–9; Feuvrier-Prévotat 1989: 381; Verboven 2007; Tran 2014; Eberle forthcoming.

³ Most recently, Müller and Hasenohr 2002. Étienne 2002: 3, 6–7 calls Delos a 'laboratoire' for developing questions about the diaspora. Müller 2002: 97 and Rizakis 2002: 110, 123 dismiss evidence for Italian landholding in Achaea and Macedonia as minimal.

⁴ ID 1416 B, II 1, ll. 5–13; ID 1417 B, II 1, ll. 94–7, 126–9 with Roussel [1916] 1987: 151, 157 (Italians leasing properties of Apollo); Cic., *Att.* 9.9.4 with Bruneau 1988: 569–73 (Atticus' properties on Delos).

⁵ Finley 1981: 188, 194; 1999: 41–3. On the diaspora and *lucrum* see Prop. 3.20.1–4; Cic., *Quinct.* 3.11–13; Hor., *Carm.* 4.12 with Thonemann 2011: 252. Errington 1988: 143 takes up these ancient perceptions in his analysis.

⁶ e.g. Wilson 1966: 160; Alcock 1989: 8; 1993: 74–6; Zoumbaki 2014b: 192. But see now Alcock 2007: 691, which we discuss below. The one scholar who has no problem with landowners among the diaspora is Hatzfeld 1919: 212–33, who calls them 'industriels', a designation that together with other passages in his works (e.g. Hatzfeld 1945: 134–5) places him on the modernist side of the early twentieth-century debate about the ancient economy.

⁷ Lanauro 2016: 247.

⁸ e.g. Halstead 1987; Kay 2014: 133–41; most influentially Horden and Purcell 2000.

⁹ The quote is from Alcock 2007: 691 (her quotation marks). See also Zoumbaki 2012: 82 and 2013: 56 who suggests that Italians 'invest in land' for 'social and economic reasons'.

¹⁰ For recent interest in Roman landholding see Erdkamp et al. 2015; Lerouxel and Pont 2016.

area. When the Romans annexed the kingdom in AD 106, they acquired a territory in which the incense trade had some considerable significance, as well as considerable potential for revenue to be gained by the taxation of this trade.

Trade in *Provincia Arabia* in the Antonine period

The Nabataean kingdom came to an end and became the new Roman province of Arabia in AD 106. Although the exact circumstances are unknown, the annexation appears to have been at least relatively peaceful and may have taken place upon the death of the reigning king, Rabbel II, who had reigned since AD 71. The epitomator of Cassius Dio briefly records the event in the following words:

κατὰ δὲ τὸν αὐτὸν τοῦτον χρόνον καὶ Πάλμας τῆς Συρίας ἄρχων τὴν Ἀραβίαν τὴν πρὸς τὴν Πέτρα ἔχειρώσατο καὶ Ῥωμαίων ὑπῆκοον ἐποιήσατο.

And at around the same time Palma, the governor of Syria, subdued Arabia about Petra and made it subject to the Romans.¹⁴⁵

Upon or soon after this invasion, the kingdom appears to have been organised as a province governed by a senatorial legate with a garrison of a single legion. In keeping with the greater importance of the northern part of the kingdom during the later first century AD, the governor appears to have been based at Bostra,¹⁴⁶ and the remains of a legionary camp indicate that the legion was based there too.¹⁴⁷

The annexation of the Nabataean kingdom

The reason for the annexation is never explicitly stated, but the possibility of commercial motives has been suggested.¹⁴⁸ This, however, is quite unlikely. If the Romans had desired to remove the 'Arabian middleman' they could have done it long before; indeed military expeditions had previously been started against the Nabataeans, although not for commercial motives.¹⁴⁹

Roman client kingdoms existed in the East because they fulfilled some role which the Romans either could not or did not wish to. By the end of the first century AD most of these kingdoms had been incorporated into the provincial system.¹⁵⁰ The persistence of the Nabataean kingdom in these circumstances shows clearly that it was not viewed as an economic rival by Rome, but as a useful vassal. However, toward the end of the first century and into the second, it seems that the Romans wished to incorporate the remaining client states, and so (presumably) upon the deaths of their respective kings the kingdoms of Herod Agrippa II and of Rabbel II were annexed by Rome.

Whether or not the decision to annex Petra was planned in advance to take place on the death of Rabbel, or, as has been suggested, took place in response to disturbances in the kingdom at that time,¹⁵¹ we cannot tell. It is clear, however, that the decision to invade would have been occasioned by political or military considerations of some sort, not by

Landed Traders, Trading Agriculturalists? Land in the Economy of the Italian Diaspora in the Greek East*

LISA PILAR EBERLE AND ENORA LE QUÉRÉ

ABSTRACT

This paper revises current understandings of the rôle of land in the economy of the Italian diaspora in the Greek East in the second and first centuries B.C., arguing that these Italians owned more land than has previously been assumed and that many of these Italian landowners practised a highly commercialized form of agriculture that focused on high-end products. This strategy shaped what empire meant both locally and in Italy and Rome, where the products they marketed fed into the ongoing consumer revolutions of the time. After discussing the evidence for the extent of Italian landholdings and examining their exploitation in three case studies, we conclude by reflecting on the long-term history of such landholdings in the provinces and the implications for our understanding of Roman imperialism more generally.

Keywords: Italian diaspora; Greek East; Roman economy; landownership and exploitation; impact of the Roman Empire; high-end goods; historical archaeology

I INTRODUCTION

Scholars have been discussing the economic profile of the many Italians who went to live in the Roman provinces during the second and first centuries B.C. for about a hundred years. The details of these discussions vary but they show a marked tendency to downplay the rôle of landholding, preferring to cast these Italians as bankers and traders, at times connected with Roman military activity. While some fail to mention land altogether or emphasize the limited extent of Italian holdings, others see land as unconnected with and incidental to the Italians' otherwise commercial interests, acquired either for social prestige or as a result of debtors defaulting. These ideas about the economic profile of the Italian diaspora are crucial for how historians imagine that this diaspora shaped Roman imperialism and its local impact.¹

* This article has its origin in a chance meeting at the École française d'Athènes in 2013, where we realized that we could combine our research to make a much broader point. In addition to the EfA, who hosted both of us at the time, and the American School for Classical Studies in Athens, who let us consult the papers of the late Virginia Grace in their archives, we thank Jean-Sébastien Balzat, Roland Étienne, Carlos Noreña, Nicholas Purcell and the audience at the Roman Discussion Forum in Oxford for their valuable feedback on our piece in the final stages of writing as well as the three anonymous reviewers for *JRS*, who made helpful suggestions for how to shorten the argument.

¹ Hatzfeld 1919 remains foundational. No study we cite here questions banking or trading. Connection to Roman military activity: e.g. Purcell 2005: 91–2; Thonemann 2010: 172–3. No mention of land: e.g. Gsell 1914: 69–73; Delplace 1977: 240–2. Italian landholding as 'occasional': e.g. Magie 1950: 163–4, 1053; Rousset 2004: 371–2.

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As with many aspects of our understanding of Rome's imperial diaspora, this downplaying of land in the diaspora's economy has no linear historiography. Instead, three separate factors have contributed to it, which can all now be called into question. First, while the Latin *negotiatores*, a word often found in relation to members of the diaspora, has commonly been thought to connote bankers and traders, there is now an ever-growing set of arguments that in the late Republic the word had a very broad scope, including landowners. Second, in the Greek East the paradigmatic status of Delos has contributed to seeing diasporic Italians as bankers and traders. Such a status, however, cannot be assumed, it must be proven; anything else would simply mean being seduced by the wealth of evidence from the site. What is more, Italians on Delos did demonstrably own land there. Lastly, Moses Finley's insistence on the incompatibility of landowning on the one hand and commerce and profit-seeking on the other, has also played a part in sidelining the role of land in accounts of the economy of the Italian diaspora, a group of people thought to be mainly concerned with *lucrum*; hence the suggestions that members of

This screenshot shows a Jupyter Notebook interface running on localhost. The title bar indicates the notebook is titled "jupyter Untitled102". The menu bar includes File, Edit, View, Run, Kernel, Settings, Help, and a Trusted button. The toolbar features icons for file operations like Open, Save, and Print, along with a Python logo icon.

PDF to RAG / LLM compatible TXT

This program takes raw PDFs from services like JSTOR and processes them to create clean text files. It does not remove everything. Individual files will need either additional manual editing or additional processing. Probably both.

Libraries

```
[9]:  
# Install the following libraries before running  
import pymupdf4llm  
import unicodedata  
import re  
import fitz # PyMuPDF  
import os
```

Functions

```
[10]:  
# Replace ligatures  
def replace_private_use_char(text):  
    replacements = {  
        # Private Use Area ligatures (PUA)  
        '\uf001': 'fi', # fi (U+F001)  
        '\uf002': 'fl', # fl (U+F002)  
  
        # Standard Unicode ligatures  
        '\ufb00': 'ff', # ff (U+FB00)  
        '\ufb01': 'fi', # fi (U+FB01)  
        '\ufb02': 'fl', # fl (U+FB02)  
        '\ufb03': 'ffi', # ffi (U+FB03)  
        '\ufb04': 'ffl', # ffl (U+FB04)  
        '\ufb05': 'ft', # ft (U+FB05)  
        '\ufb06': 'st', # st (U+FB06)  
    }  
  
    # First, manual replacements for known ligatures  
    for char, replacement in replacements.items():
```

The screenshot shows a Jupyter Notebook interface with the following details:

- Toolbar:** Includes standard Mac OS X window controls (red, yellow, green buttons), a file icon, back/forward arrows, a refresh icon, and a search bar labeled "localhost".
- Header:** Shows the title "jupyter Untitled102" and a Python logo icon.
- Menu Bar:** File, Edit, View, Run, Kernel, Settings, Help.
- Kernel:** Python 3 (ipykernel).
- Cell 26:** Contains a Python function definition for removing multiple regex patterns from a document. The code includes docstrings for arguments and return values, and uses regular expressions from the `re` module.
- Cell 27:** Contains a list of regex patterns for processing to remove from a document. It includes patterns for square bracket numbers, bibliography, and footer blocks.
- Cell 28:** Contains a list of regex patterns for post-processing to remove from a document. It includes patterns for removing some markdown formatting and repeated newlines.
- Cell 29:** Contains a Python function definition for crawling a directory and processing all PDFs. It uses `os.walk` to traverse the directory and `os.path` to handle file paths. It checks if a file already exists before processing it.

Ancient Economy

John Glendenning

2025-04-22

Cleaning Functions

```
fix_ligatures <- function(text) {
  replacements <- c(
    "\uf001" = "fi", "\uf002" = "fl", "\ufb00" = "ff", "\ufb01" = "fi",
    "\ufb02" = "fl", "\ufb03" = "ffi", "\ufb04" = "ffl", "\ufb05" = "ft", "\ufb06" = "st"
  )
  for (char in names(replacements)) {
    text <- str_replace_all(text, fixed(char), replacements[[char]])
  }
  text <- stringi::stri_trans_general(text, "NFKC")
  return(text)
}

fix_hyphens_apostrophes <- function(text) {
  text <- str_replace_all(text, "-\\n", "")
  text <- str_replace_all(text, "\\n", " ")
  text <- str_replace_all(text, "[‘’]", "''")
  text <- str_replace_all(text, "[“”]", "““")
  return(text)
}

remove_regex_patterns <- function(text) {
  patterns <- c(
    # Inline footnotes like ".12"
    "(?=<\\S)[.]\\d{1,2}",

    # Bracketed footnotes like "(12)" or " 12 "
    "(?=<[\\s.,;])\\((?\\d{1,3}\\))?(?=\\s.,;)",

    # Entire lines starting with a number and period
    "^(\\d{1,3}[.]\\s.*$",

    # Remove everything from references sections onward
    "(?s)(References|Bibliography|Works Cited)[\\s\\S]+$",

    # Common boilerplate copyright/legal references
    "(?i)^Stable URL|JSTOR|Brill|This content downloaded|All use subject|Creative Commons\\n?",
```

Directory Crawl and Processing

```
main_log_path <- file.path(log_output, "processing_log.txt")
main_log <- file(main_log_path, open = "wt")
writeLines(paste("== Processing started:", Sys.time(), "==\\n"), con = main_log)

decade_folders <- list.dirs(input_path, full.names = TRUE, recursive = FALSE)

walk(decade_folders, function(folder) {
  decade <- basename(folder)
  decade_output <- file.path(output_path, decade)
  dir.create(decade_output, recursive = TRUE, showWarnings = FALSE)

  decade_log_path <- file.path(log_output, paste0(decade, "_removed_words.txt"))
  decade_log <- file(decade_log_path, open = "wt")

  pdf_files <- list.files(folder, pattern = "\\.\pdf$", full.names = TRUE)

  walk(pdf_files, function(pdf_path) {
    out_file <- file.path(decade_output, paste0(tools::file_path_sans_ext(basename(pdf_path)),
      if (file.exists(out_file)) {
        writeLines(paste(Sys.time(), "SKIPPED:", basename(pdf_path)), con = main_log)
        return()
      }

    raw_text <- pdf_text(pdf_path) %>% paste(collapse = "\\n")
    raw_text <- fix_ligatures(raw_text)
    raw_text <- fix_hyphens_apostrophes(raw_text)
    # raw_text <- remove_notes(raw_text)
    raw_text <- remove_regex_patterns(raw_text)
    raw_text <- stringr::str_squish(raw_text)

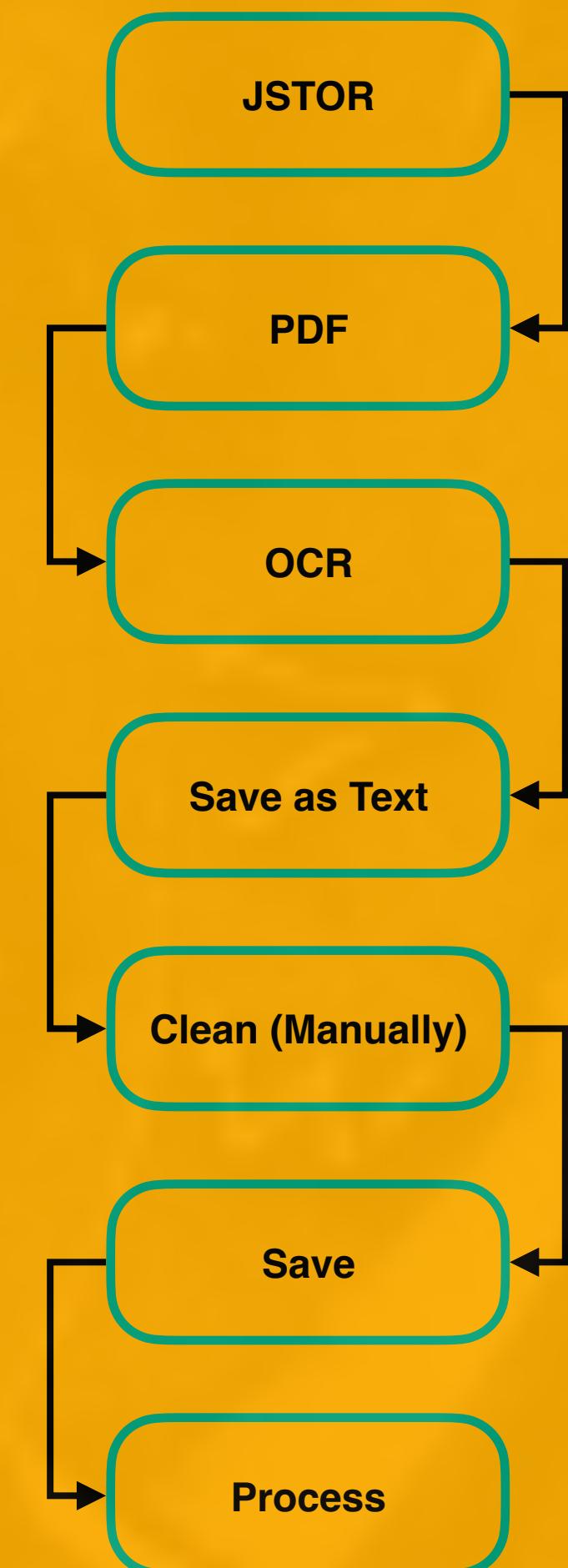
    # Preserve intermediate state BEFORE exclusion
    text_before_exclusion <- raw_text

    # Apply spellchecking and exclusion filtering
    raw_text <- spellcheck_text(raw_text, correct = TRUE)
    final_text <- filter_exclusion(raw_text, exclusion_words)

    # Compare pre- and post-exclusion for logging
    log_removed_words(text_before_exclusion, final_text, logfile = decade_log, docname = basename

    # Skip output if the cleaned text is empty or too short
    if (nchar(final_text) < 10) {
      writeLines(paste(Sys.time(), "EMPTY OUTPUT SKIPPED:", basename(pdf_path)), con = main_log)
      return()
    }
  })
})
```

Actual Processing Pipeline



Data Collection

Text Preprocessing

NLP

Interpretation & Visualization

Identify Relevant Sources

Extract Full Texts

Organize References

Convert Formats

Clean and Normalize Text

Segment Texts

Named Entity Recognition

Topic Modeling

Sentiment Analysis

Network Analysis

Qualitative Review

Visualizations

Summary

Definitions

manumission

release from slavery: a leading advocate of manumission | [as modifier] : manumission documents from the Slavery Chancellery | negotiated manumissions of slaves by their masters.

peculium

the savings of a son or a slave with the father's or master's consent; a little property or stock of one's own; any exclusive personal or separate property.

Analysis Goals

- 1. Did the discussion of slavery in academic writing change over time?**
- 2. How did it change?**
- 3. What was measured for the change?**

Results

1. Did the discussion of slavery in academic writing change over time?

- Yes!
- The discussion of slavery in academic writing changed over time.

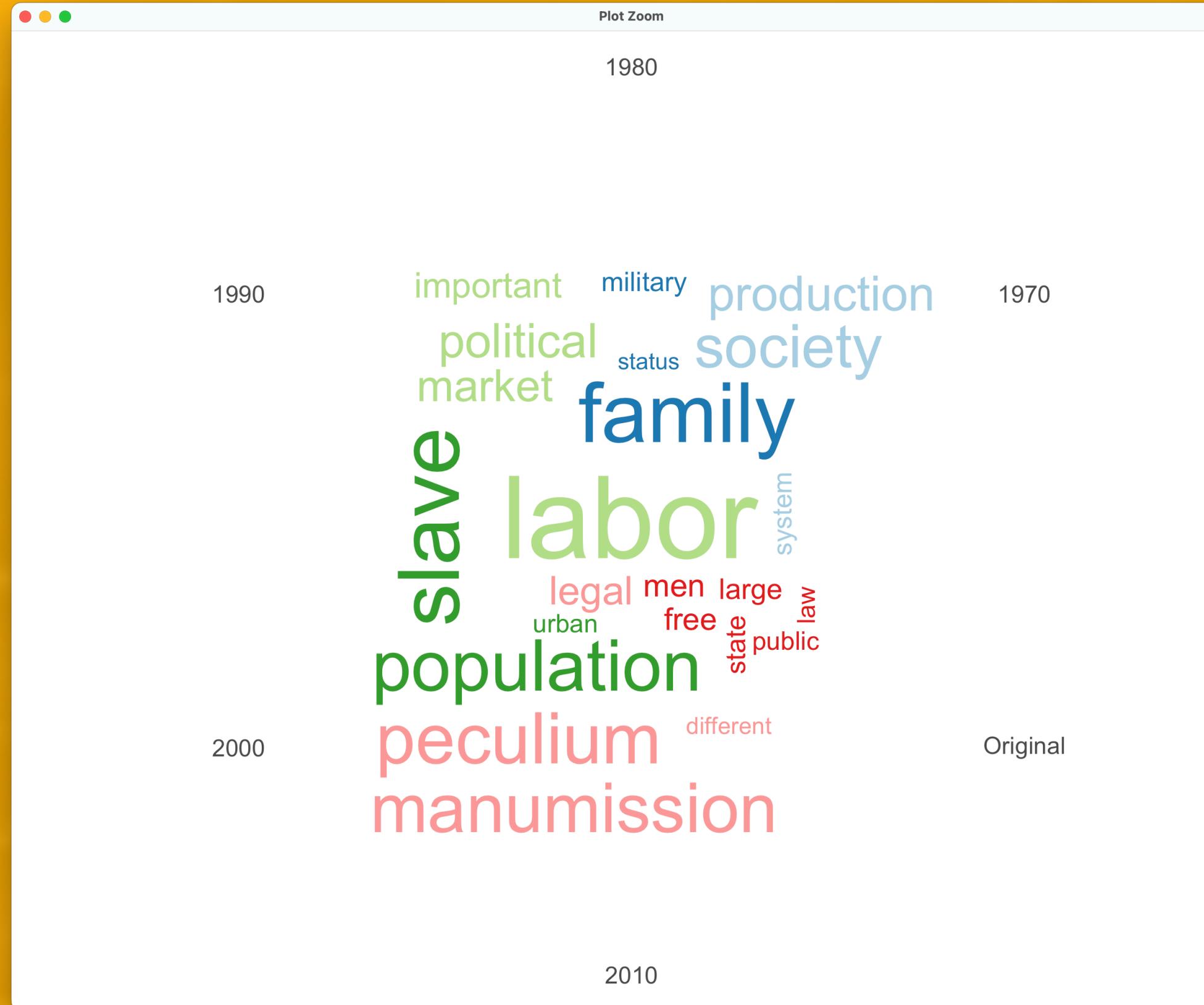
2. How did it change?

- Shifted from legal and economic structures to themes of personal agency, resistance, and moral framing.
- More neutral analytical tone.
- Did the contextual meaning of “slave” evolve?

3. What was measured for change?

- Frequency counts
- Collocation patterns
- Sentiment scores
- Topic modeling
- Lexical dispersion
- Semantic drift

Word Clouds



Top Words in 1990

labor

Top Words in 1980

family
slave
labor

Top Words in 1970

A word cloud diagram centered around the word "production". Other words include "slave", "society", "labor", "system", "urban", "population", "market", "status", "free", "military", "public", "political", "state", "different", "legal", "important", and "slaves".

Top Words in Original

A word cloud centered around the word "slave". Other prominent words include "status", "urban", "state", "men", "production", "free", "market", "legal", "family", "public", "different", "society", "law", "labor", "large", "political", "population", and "important". The words are colored in various shades of blue, green, orange, and red.

Top Words in 2000

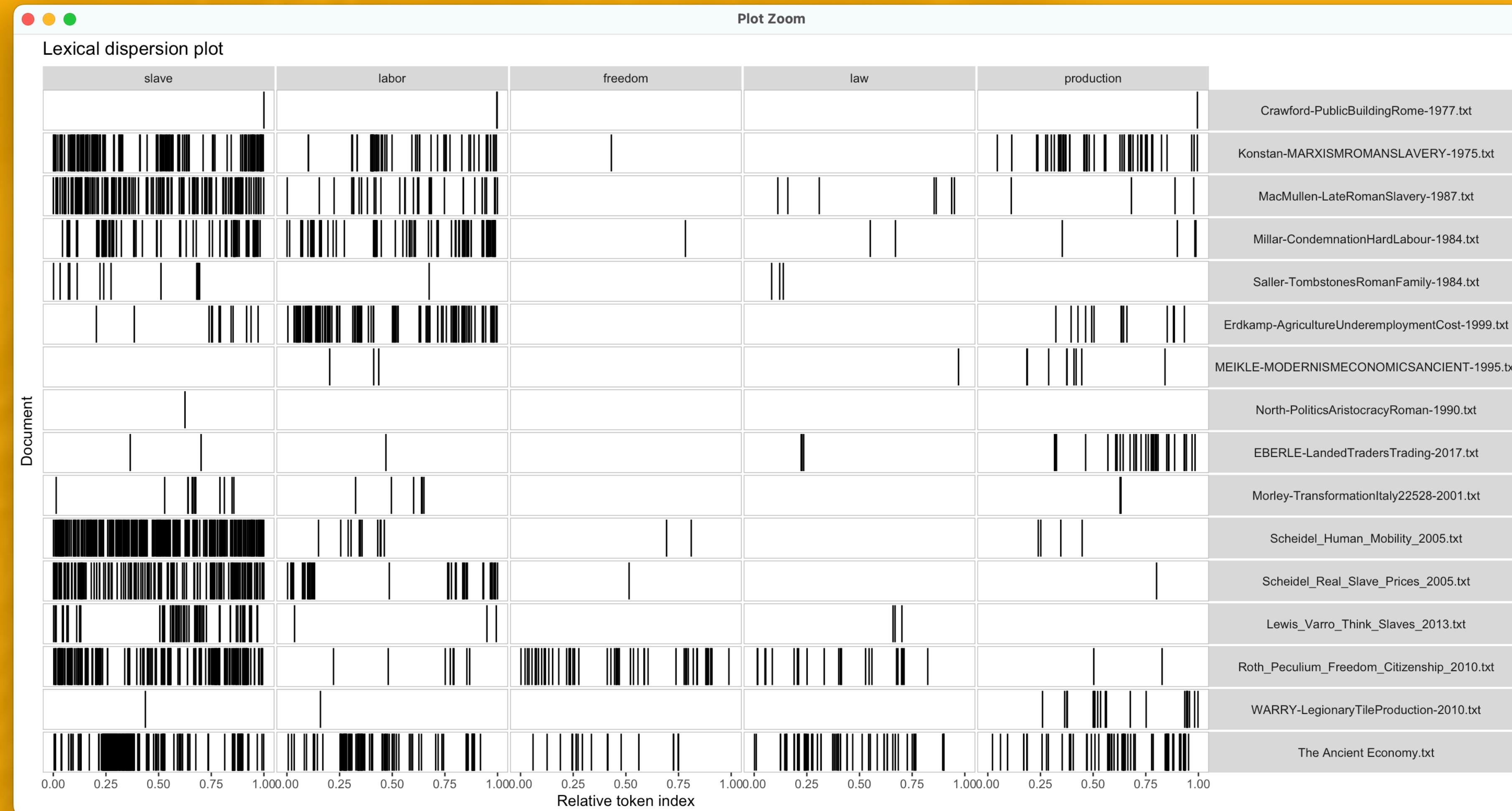
population
slave

market
large urban status legal product
state men free law political
family manumission labor military society
important

The figure is a word cloud centered around the word "slave". The word "slave" is the largest and most prominent word in the center. Surrounding it are several other words in various colors: "peculium" (pink) and "manumission" (pink) are on the far left and right respectively; "important" (light blue), "status" (light blue), and "legal" (orange) are above "slave"; "free" (teal), "different" (orange), "men" (brown), "production" (light blue), "law" (light blue), and "system" (light blue) are below "slave"; "society" (teal), "labor" (brown), and "state" (light blue) are at the bottom. The background is white with a light gray grid.

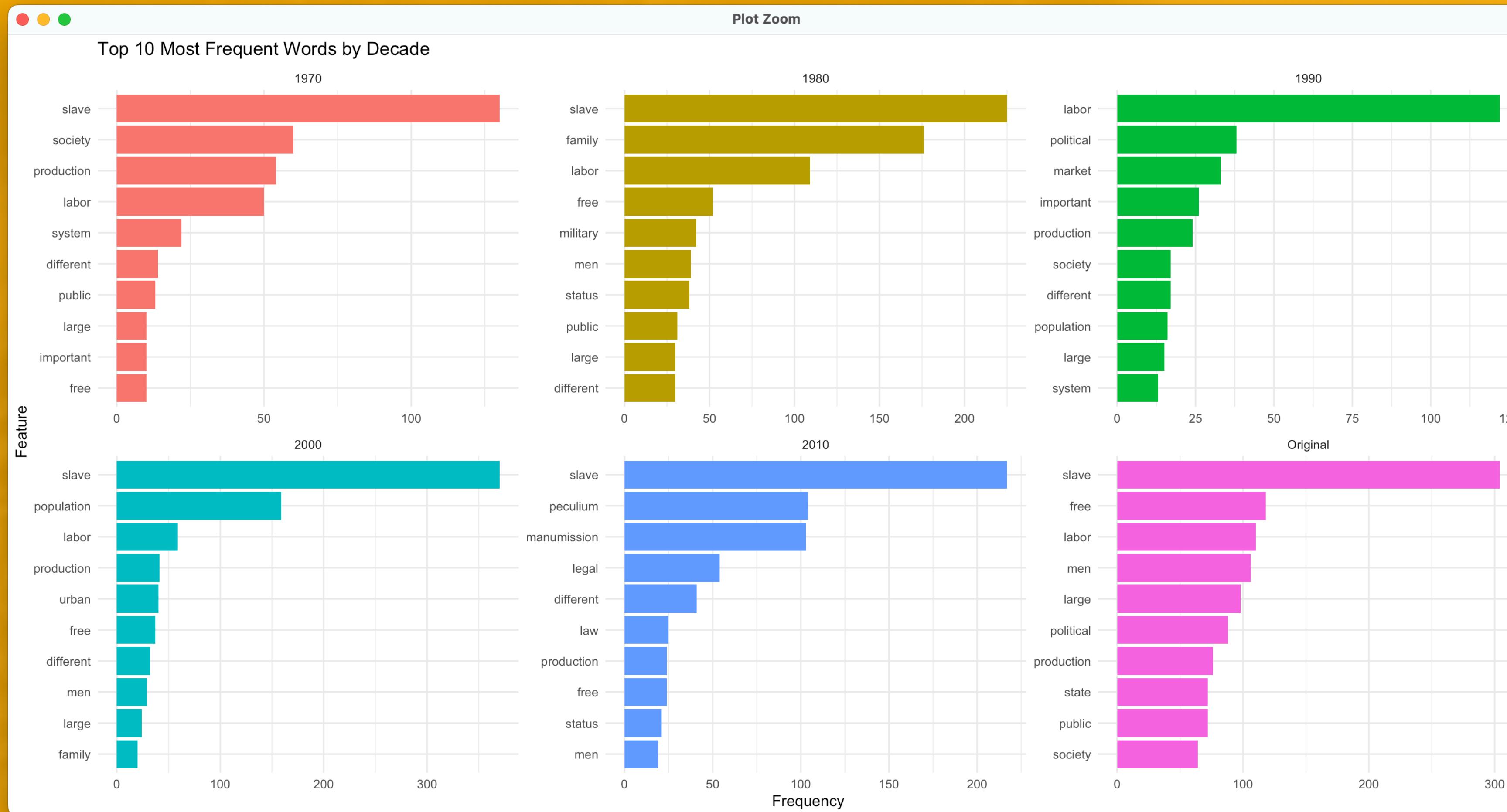
Shift from economic/labor to individuals.

Lexical Dispersion Plot



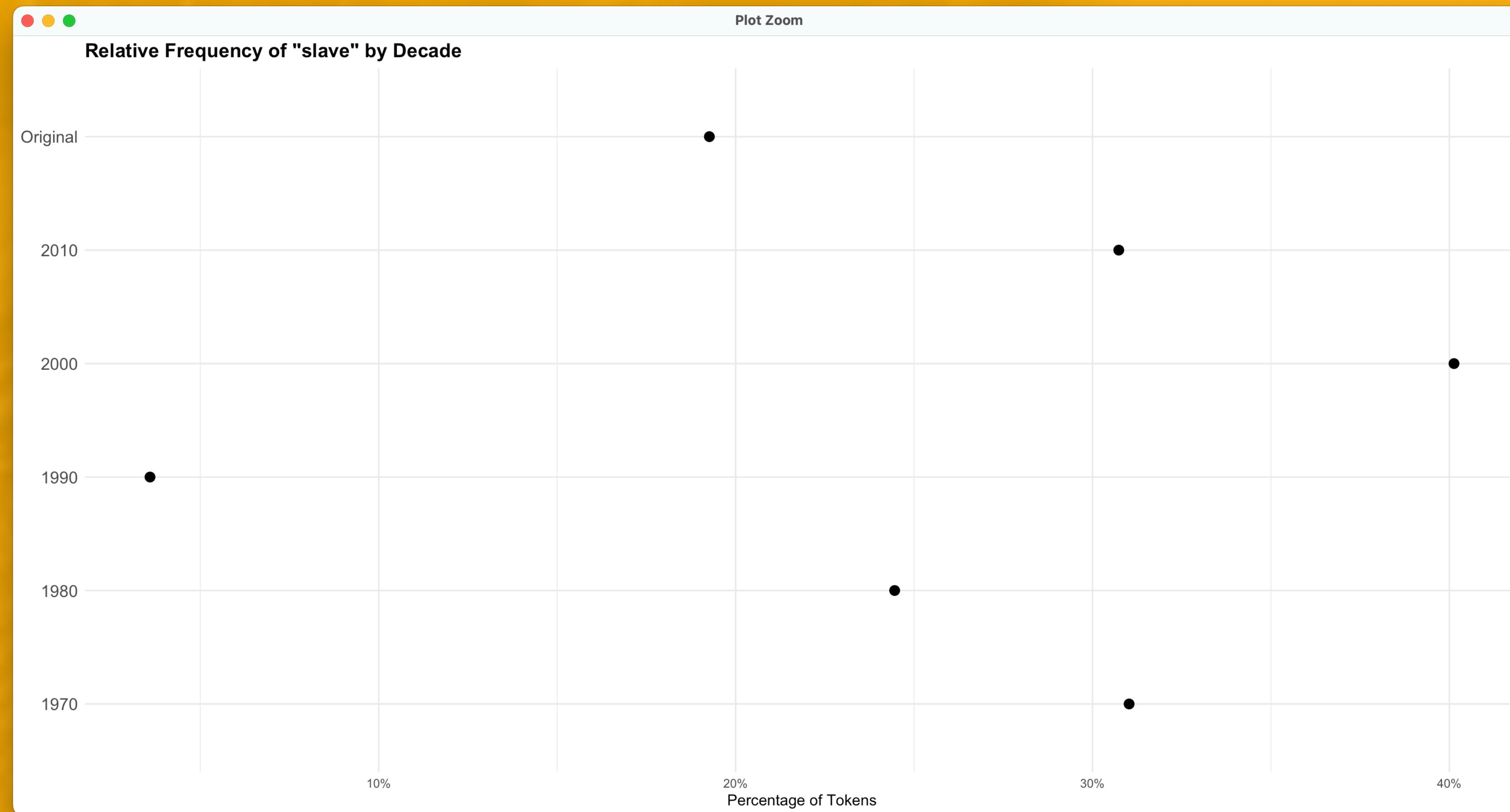
Older documents tend to use slave in economic contexts.

Word Frequency



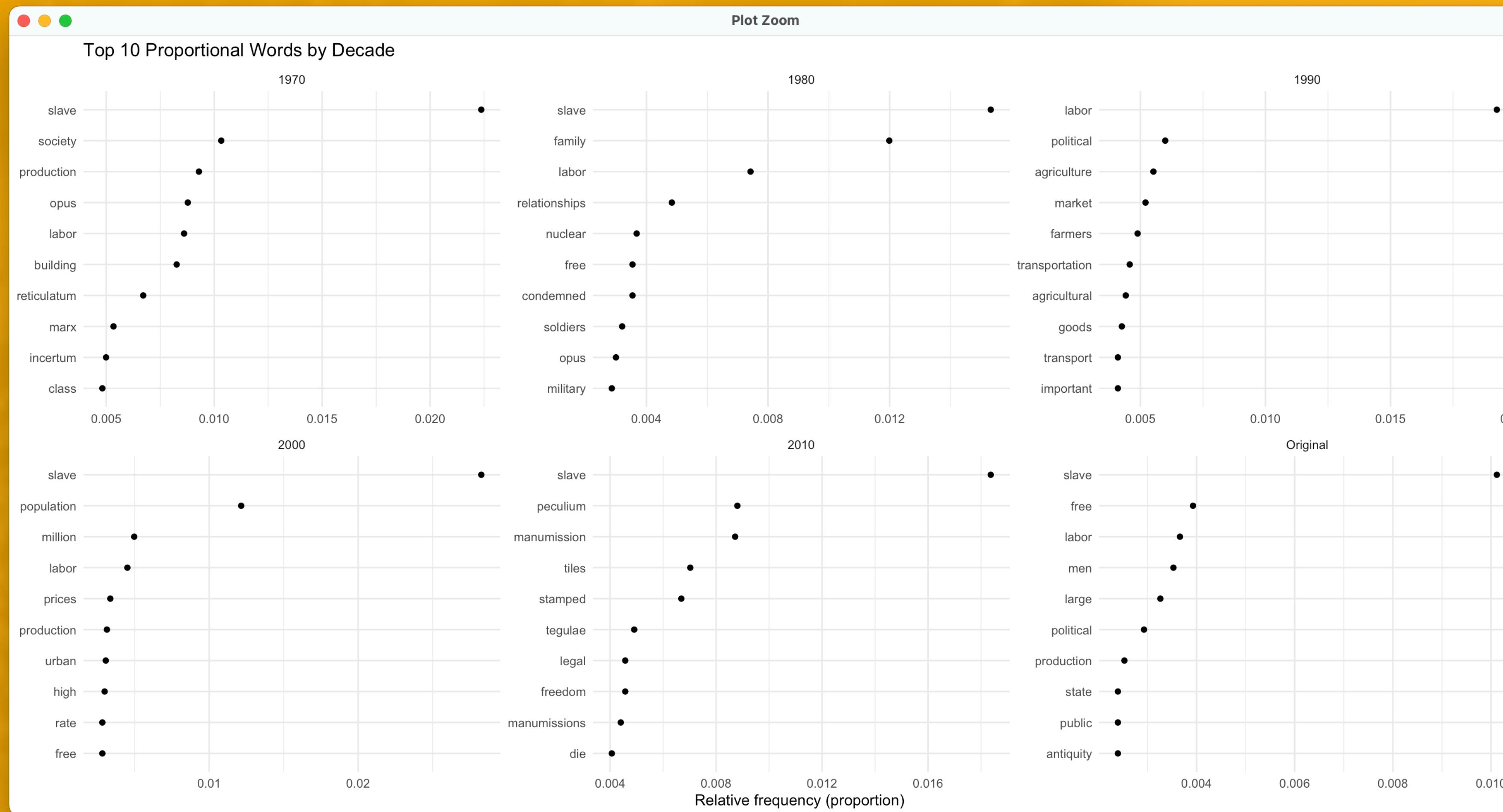
Shift in the context of slavery from labor / production to personal agency.

Frequency of “slave” by Decade



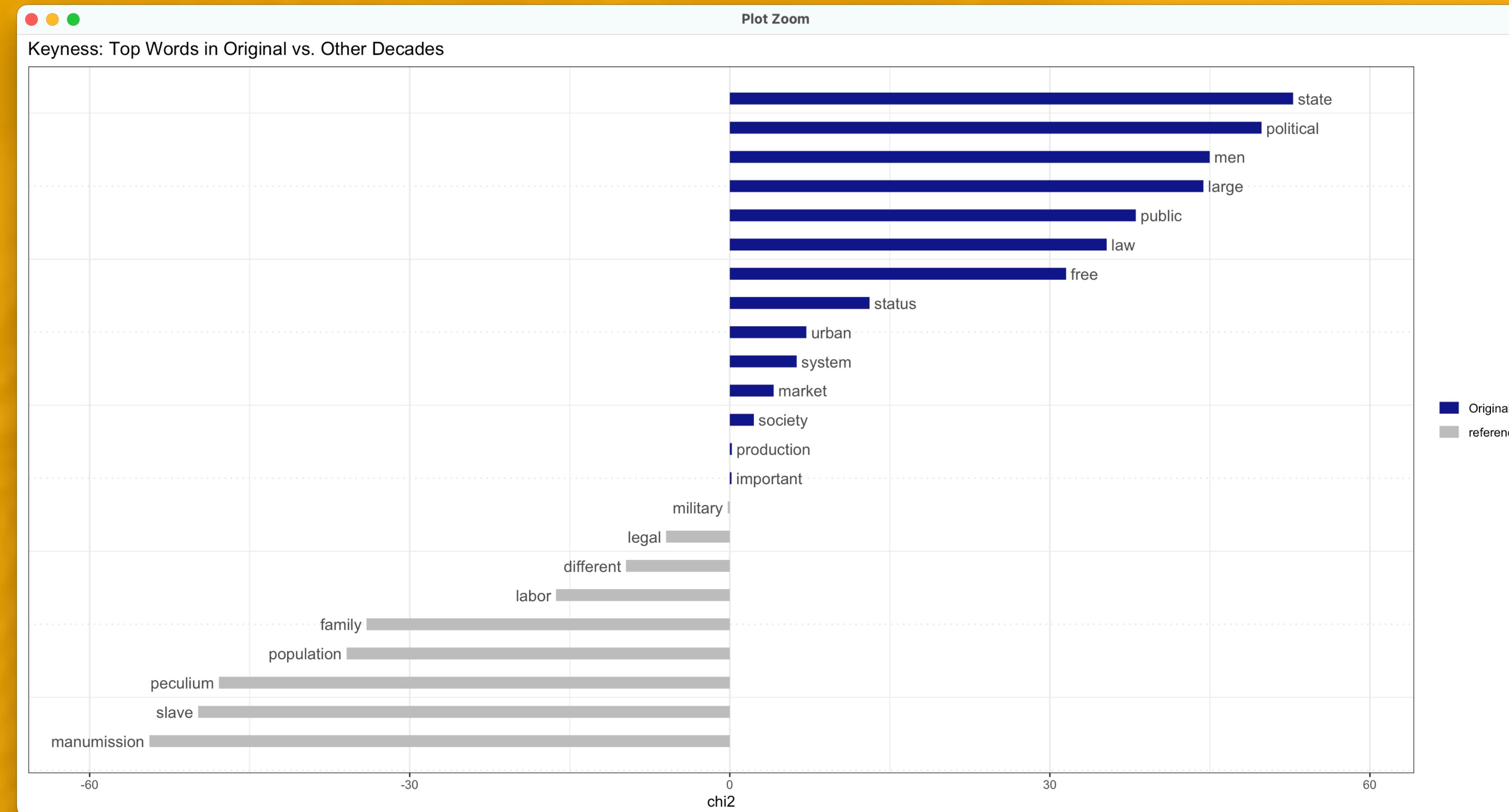
1990s low relative frequency of ‘slave’ probably reflects the corpora.

Proportion by Decade



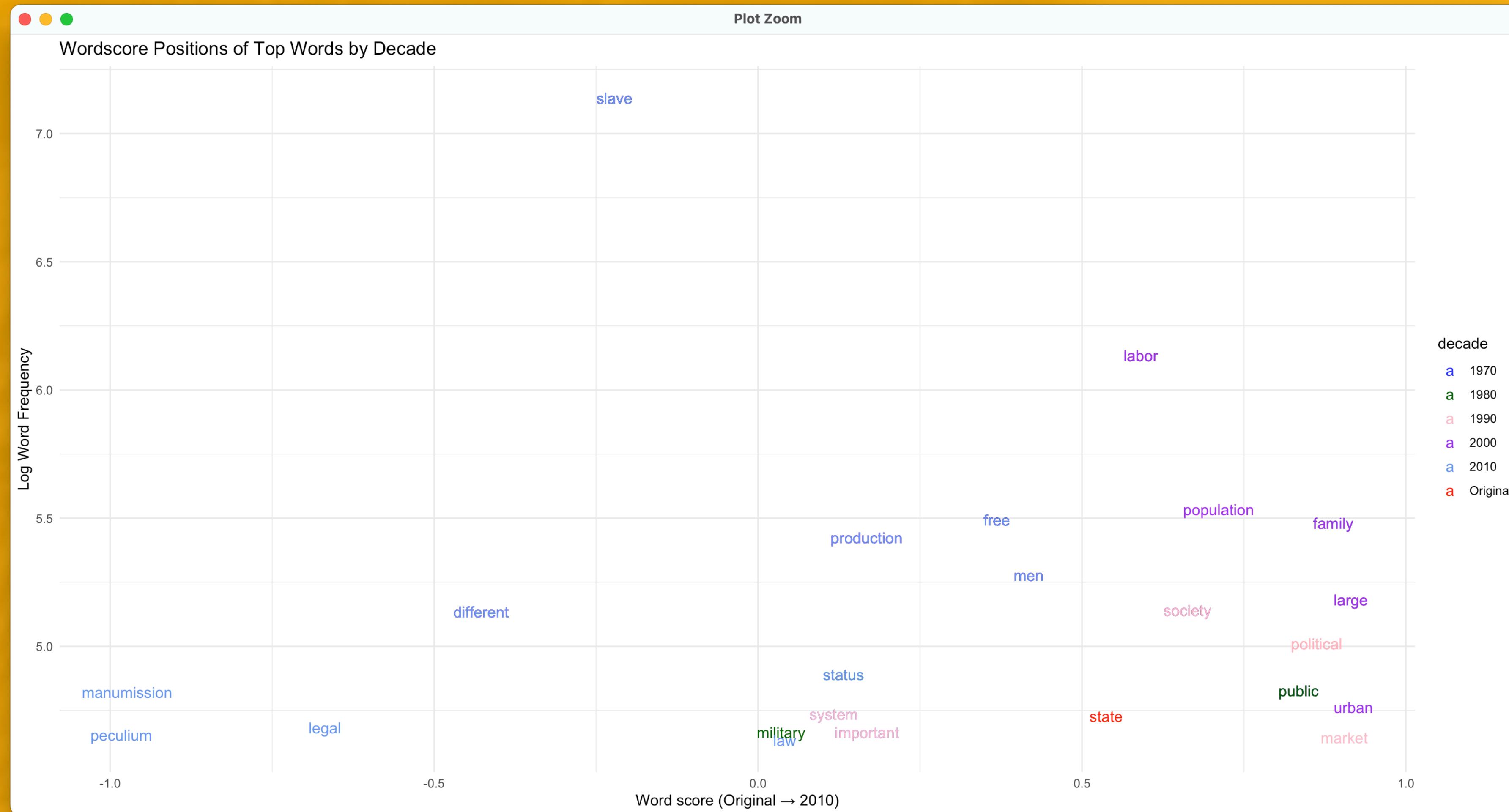
Shift over time from economic impact of slavery to legal status and rights.

Keyness of Original



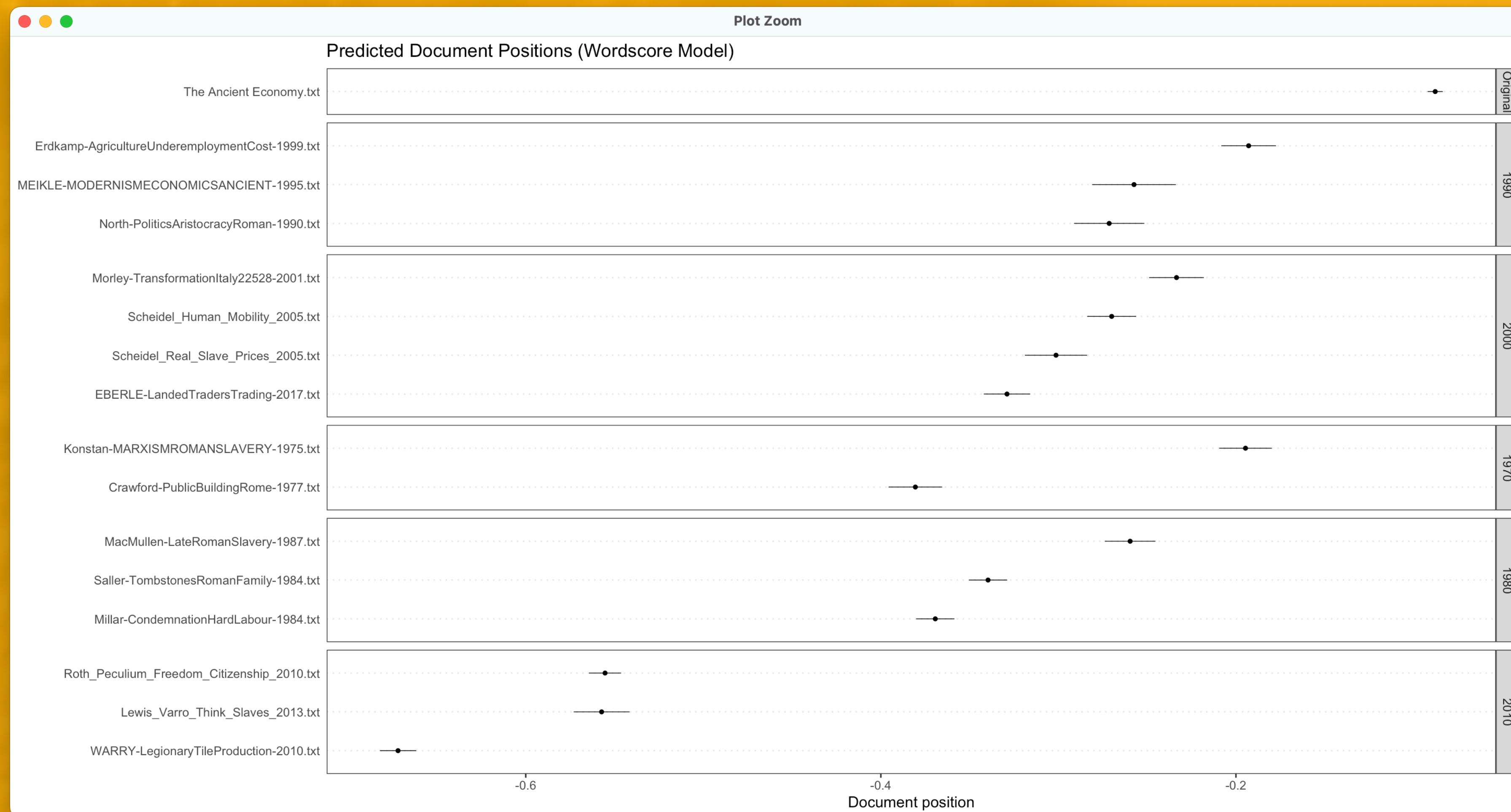
Shift from structural and institutional framework to individuals.

Wordscore by Decade



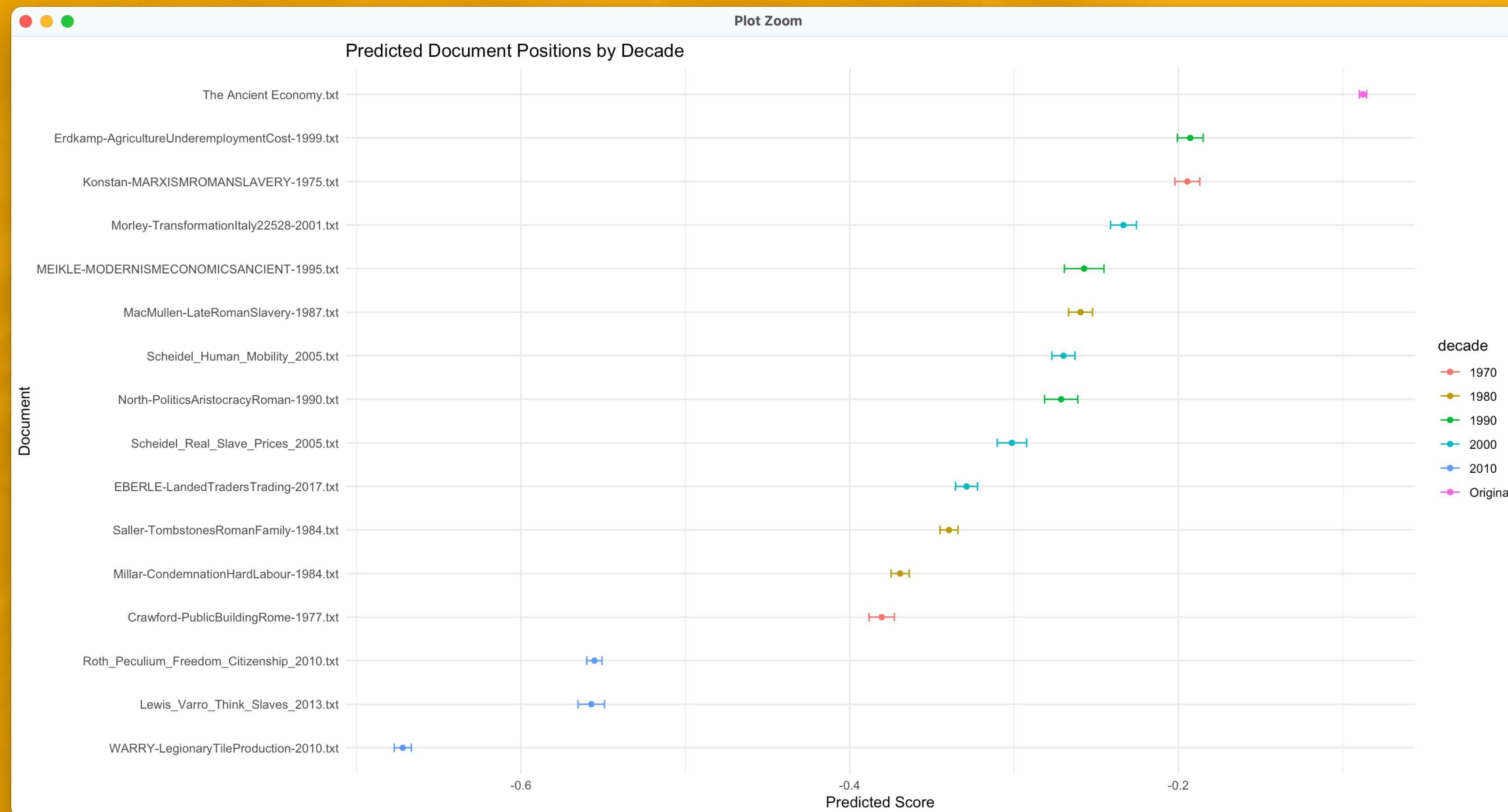
Semantic shift in discussion of slavery

Predicted Document Positions



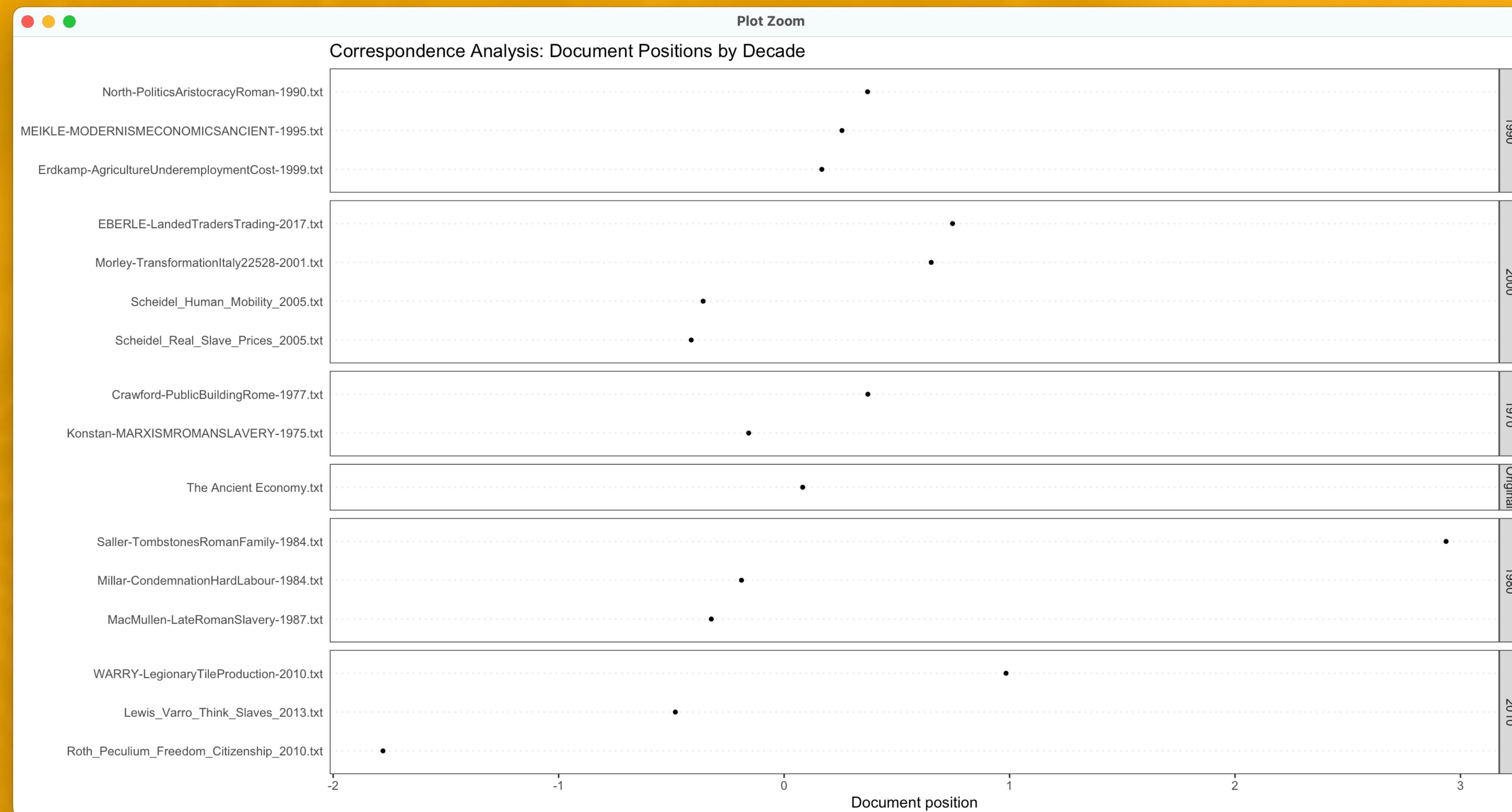
Framing of slavery in academic writing has shifted

Predicted Document Positions



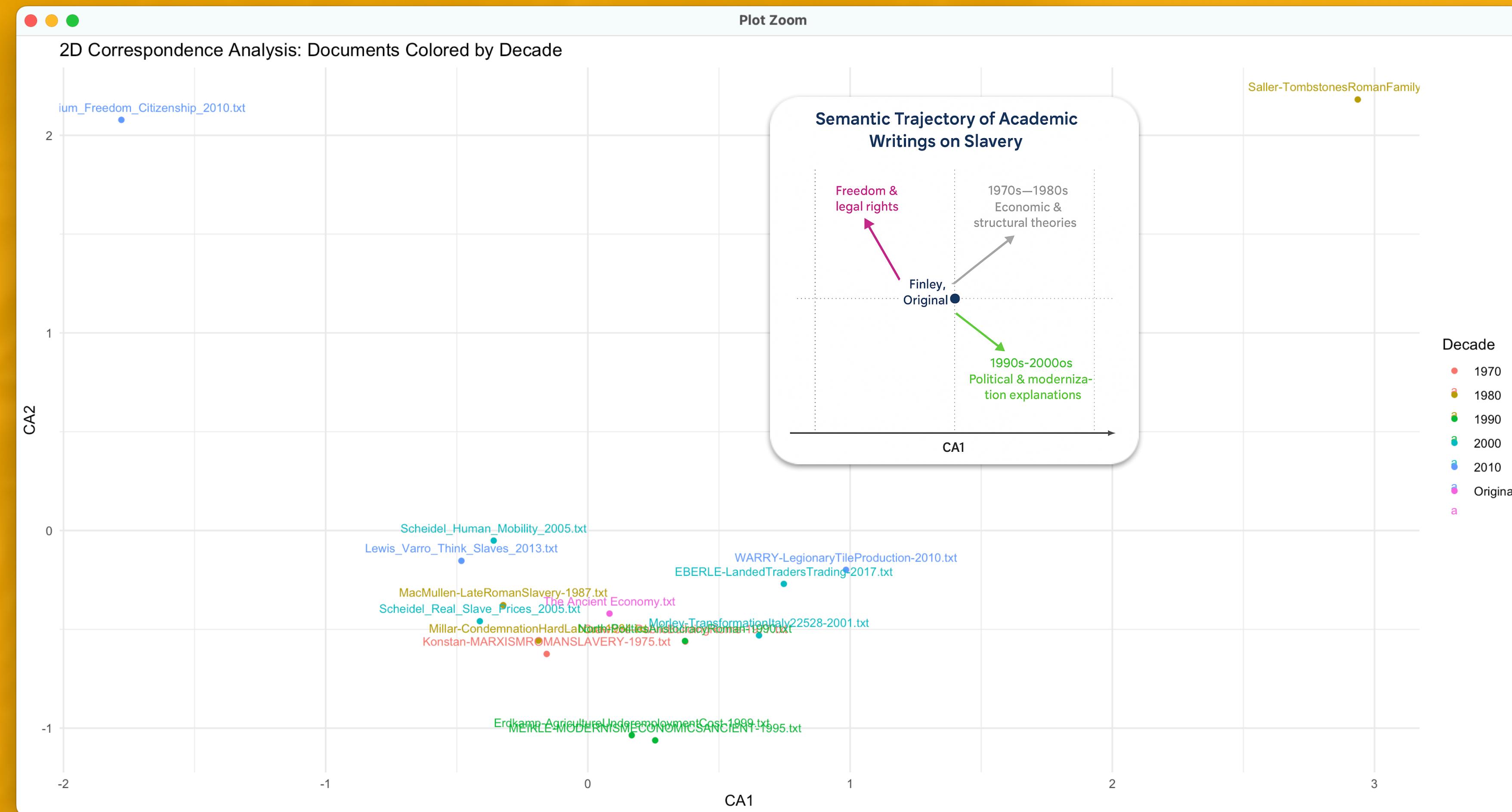
Semantic drift in framing of slavery

Correspondence Analysis



Semantic bifurcation

Correspondence Analysis



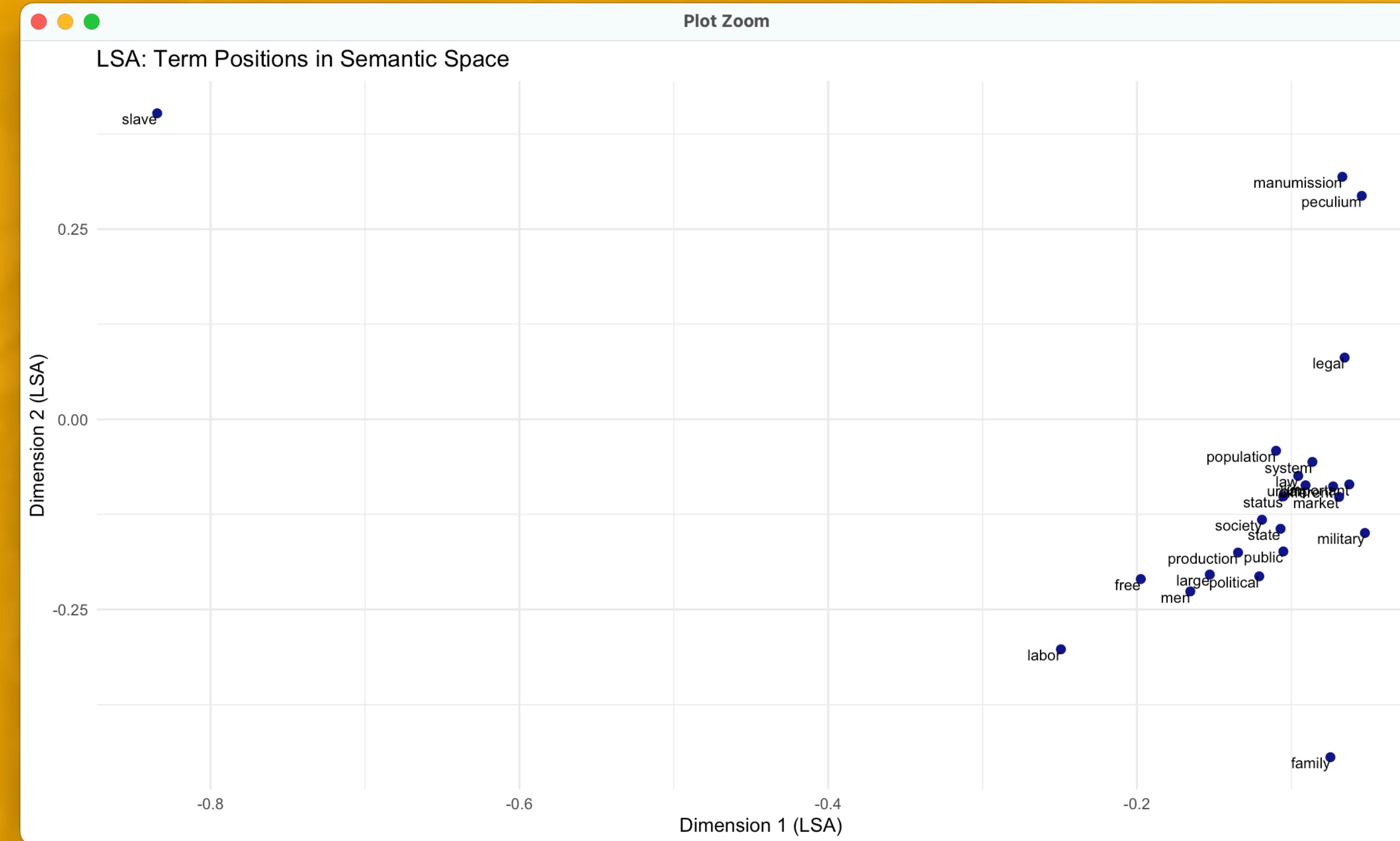
Semantic evolution

Latent Semantic Analysis



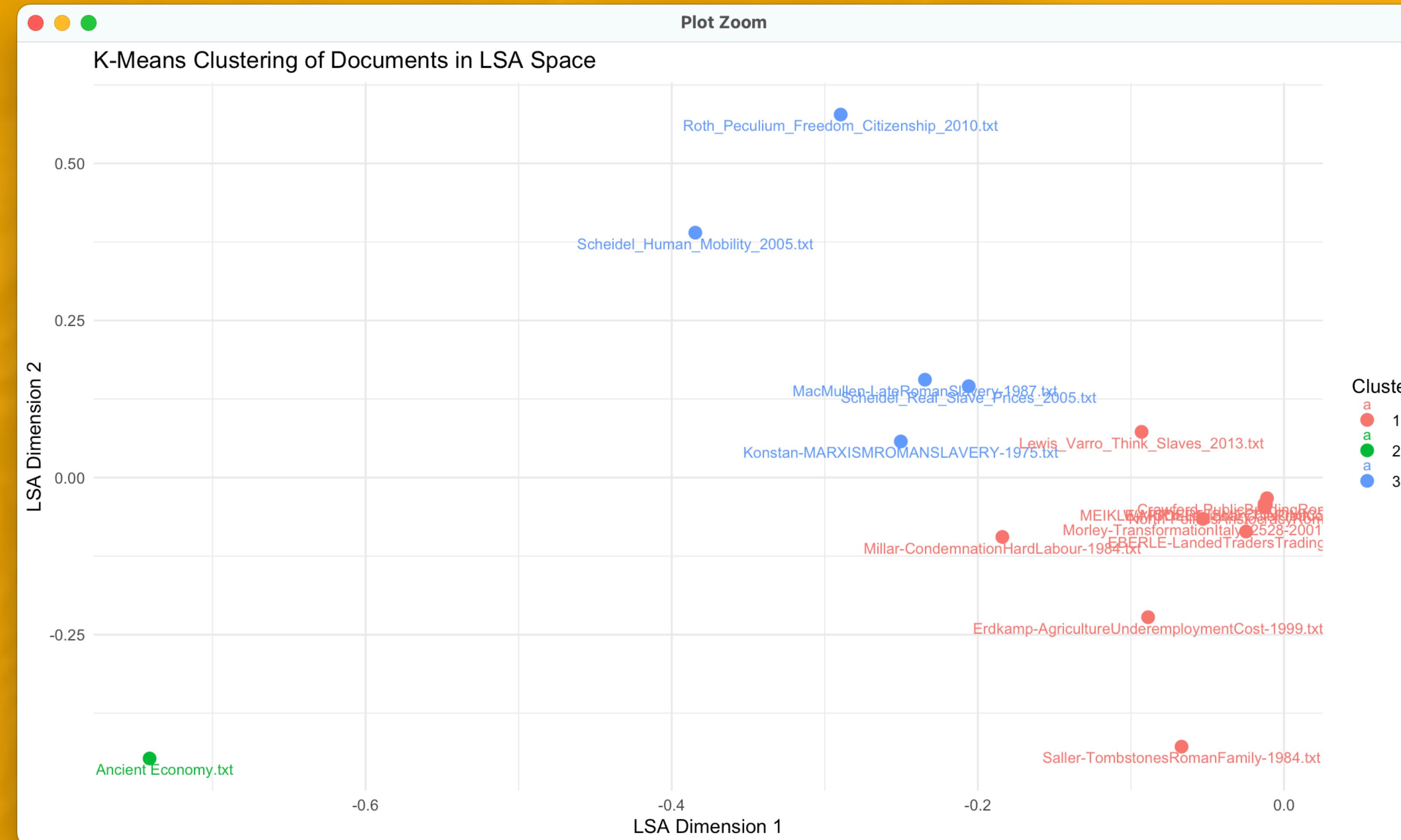
Semantic shift away from Finley

Latent Semantic Analysis



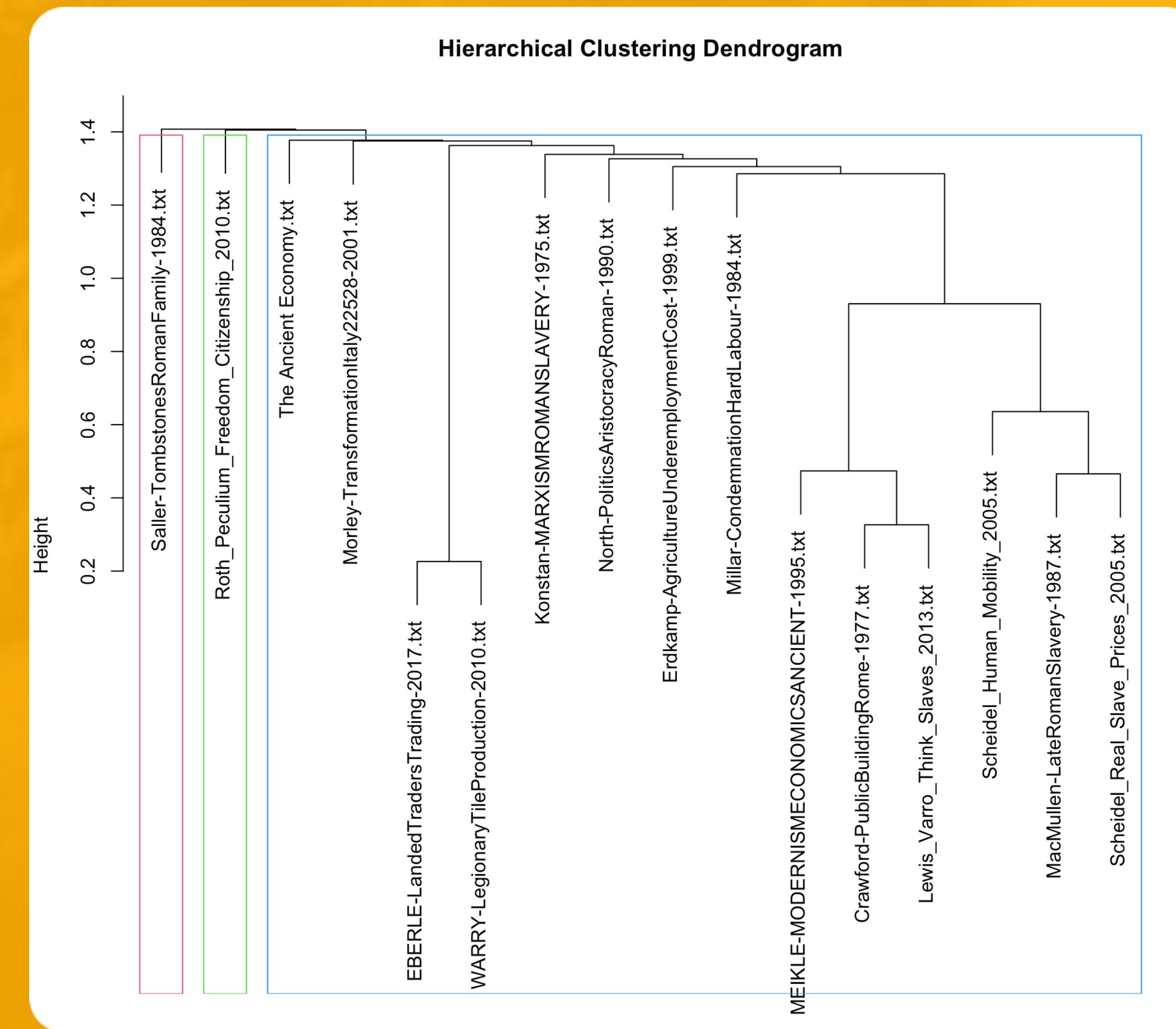
Continued Semantic Distinction

K-means Clustering



The Ancient Economy is semantically isolated

Hierarchical Clustering Dendrogram



Most texts are semantically aligned

Topics (STM)

Initial Analysis

Topic 1 – Slavery & Legal Status

slave, free, large, legal, manumission, system, state, urban, status, society

Topic 2 – Family & Military Life

family, military, different, society, important, urban, legal, large, status, state

Topic 3 – Politics & Institutions

political, important, system, different, status, state, law, society, free, manumission

Topic 4 – Freedom & Ownership

manumission, peculium, legal, law, status, system, different, state, society, important

Topic 5 – Urban Demography

population, urban, large, free, different, important, manumission, society, state, status

Topic 6 – Production & War

production, different, military, large, society, system, law, important, free, manumission

Topic 7 – Markets & Structure

society, market, system, state, law, important, large, free, military, different

Topic 8 – Labor & Control

labor, large, important, legal, free, status, state, system, different, society

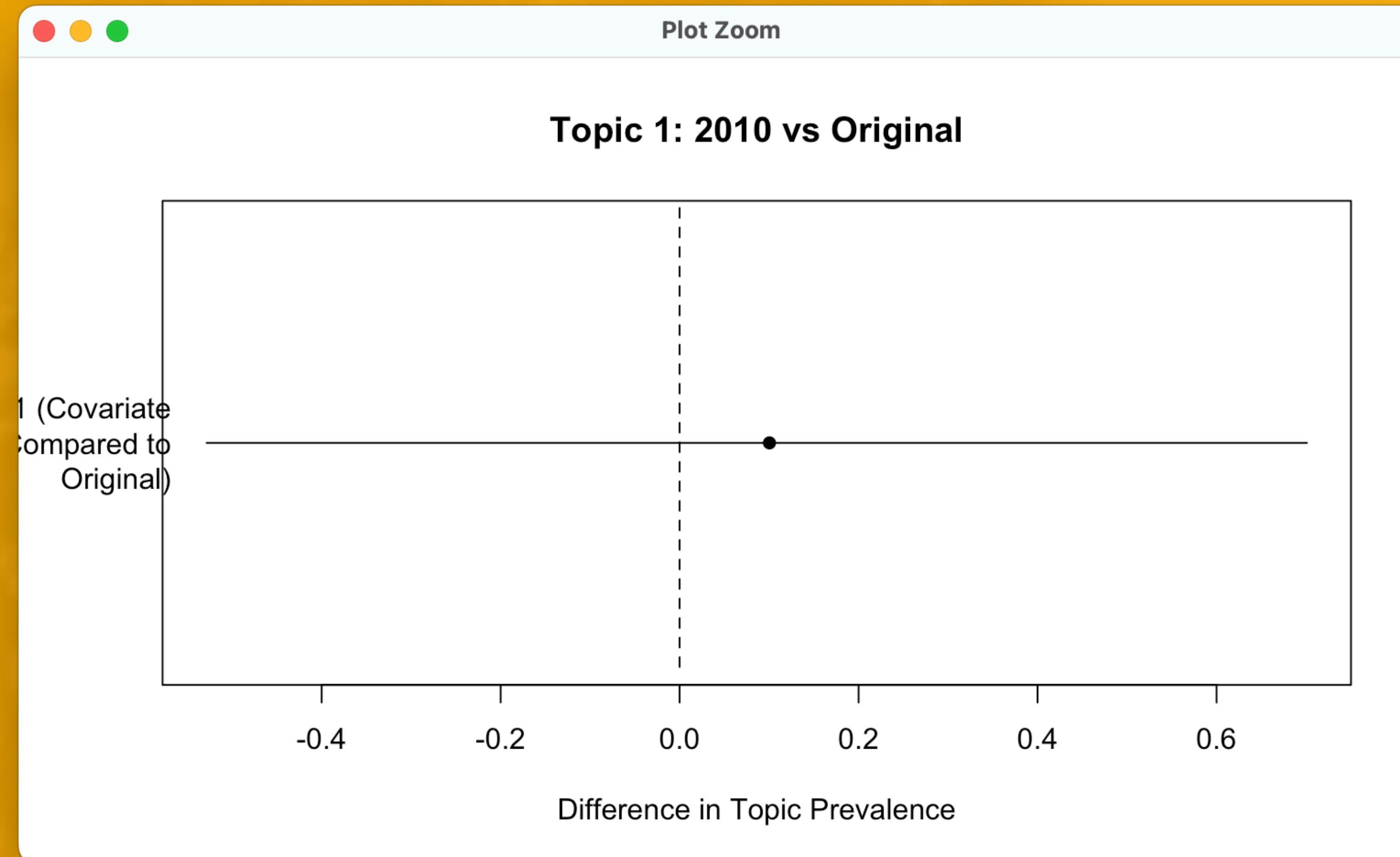
Topic 9 – Public Systems

public, large, state, urban, system, status, different, legal, important, free

Topic 10 – Gender & Citizenship

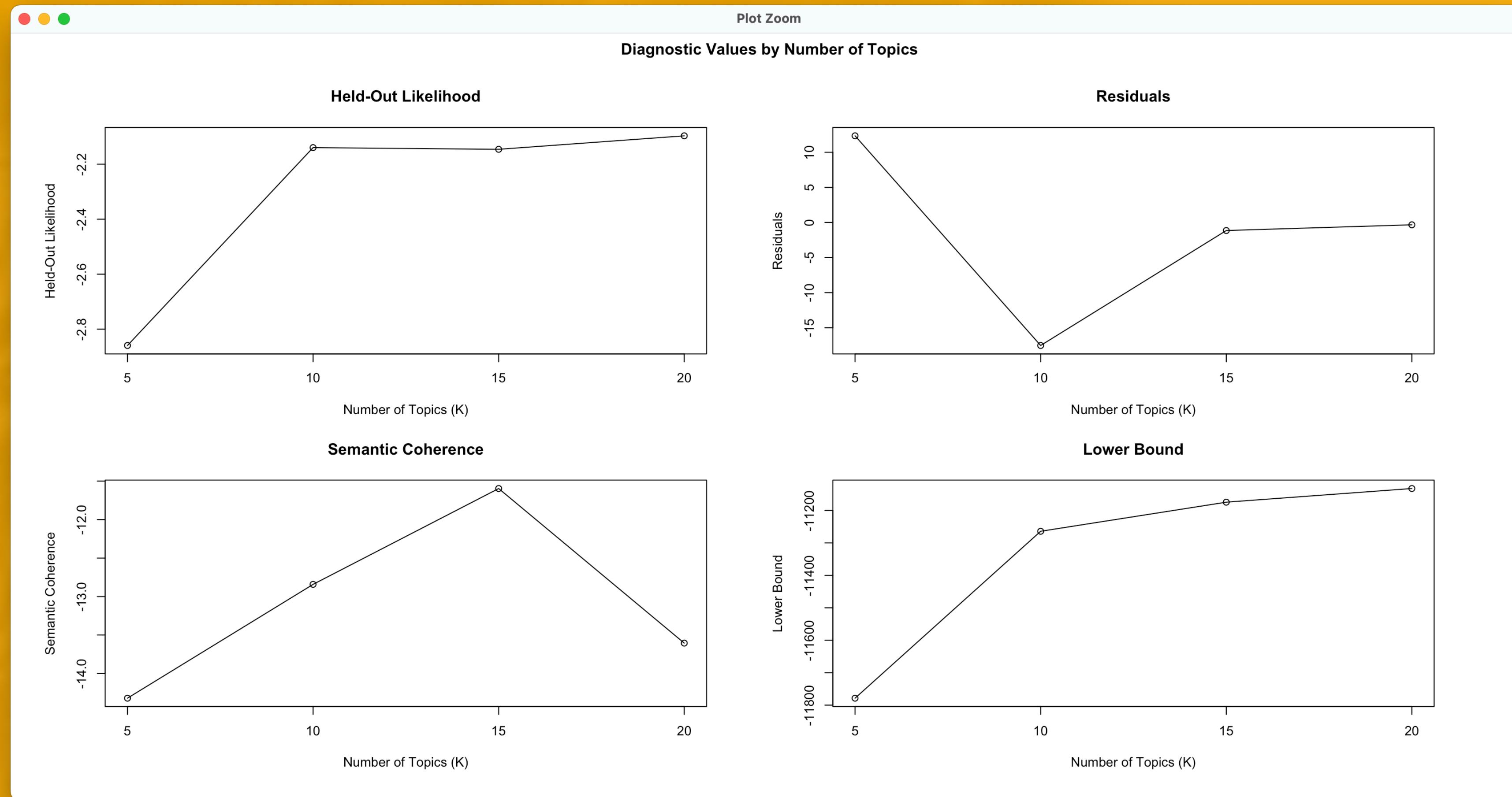
men, free, status, law, legal, state, society, large, different, manumission

Topic 1: 2010 vs Original



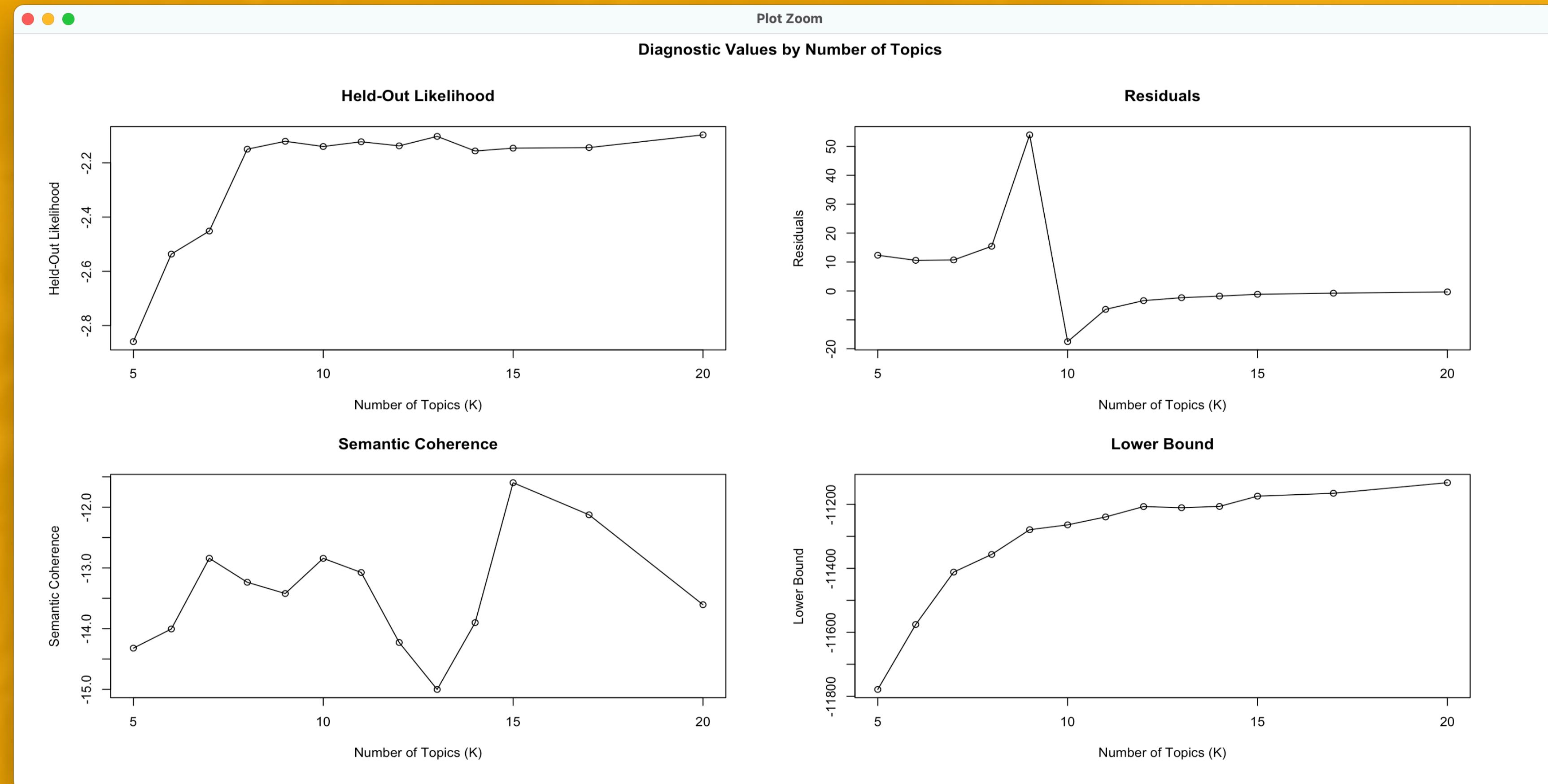
Topic 1 appears slightly more in 2010, but not statistically significant.

Diagnostic Values (K)



K = 15 may be a better choice, Rerun Analysis

Diagnostic Values (K)



K = 15 for interpretability; K = 10 for simplicity

Topics (STM)

Second Analysis

Topic 1 – Slavery & Legal Status

slave, free, large, legal, manumission, system, state, urban, status, society

Topic 2 – Family & Military Life

family, military, different, society, important, urban, legal, large, status, state

Topic 3 – Politics & Institutions

political, important, system, different, status, state, law, society, free, manumission

Topic 4 – Freedom & Ownership

manumission, peculium, legal, law, status, system, different, state, society, important

Topic 5 – Urban Demography

population, urban, large, free, different, important, manumission, society, state, status

Topic 6 – Production & War

production, different, military, large, society, system, law, important, free, manumission

Topic 7 – Markets & Structure

society, market, system, state, law, important, large, free, military, different

Topic 8 – Labor & Control

labor, large, important, legal, free, status, state, system, different, society

Topic 9 – Public Systems

public, large, state, urban, system, status, different, legal, important, free

Topic 10 – Gender & Citizenship

men, free, status, law, legal, state, society, large, different, manumission

Topic 11 – Military Service & Liberation

military, free, large, law, manumission, legal, system, urban, state, important

Topic 12 – Social Order & Emancipation

society, law, large, free, manumission, system, different, status, legal, important

Topic 13 – Governance & Social Structure

system, free, law, status, important, large, state, political, society, manumission

Topic 14 – State & Civil Rights

state, status, free, law, legal, important, system, large, society, different

Topic 15 – Variation & Law

different, free, law, large, important, system, legal, society, state, manumission

Topics (STM)

Second Analysis by Decade

Topic 1:

Coefficients:					
	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	0.19333	0.18267	1.058	0.315	
decade1980	0.08812	0.24094	0.366	0.722	
decade1990	-0.16354	0.23450	-0.697	0.501	
decade2000	0.12046	0.22820	0.528	0.609	
decade2010	0.10769	0.23904	0.450	0.662	
decadeOriginal	0.01386	0.32068	0.043	0.966	

Topic 5:

Coefficients:					
	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	0.036822	0.107002	0.344	0.738	
decade1980	0.017691	0.138901	0.127	0.901	
decade1990	0.001038	0.138193	0.008	0.994	
decade2000	0.193474	0.134294	1.441	0.180	
decade2010	-0.028083	0.136351	-0.206	0.841	
decadeOriginal	-0.002899	0.183732	-0.016	0.988	

Topic 9:

Coefficients:					
	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	0.20248	0.08343	2.427	0.0356 *	
decade1980	-0.15262	0.10171	-1.501	0.1644	
decade1990	-0.16992	0.09946	-1.708	0.1184	
decade2000	-0.18084	0.09668	-1.871	0.0909 .	
decade2010	-0.18986	0.10092	-1.881	0.0893 .	
decadeOriginal	-0.07426	0.13653	-0.544	0.5984	

Topic 13:

Coefficients:					
	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	0.055557	0.032885	1.689	0.122	
decade1980	-0.044954	0.040641	-1.106	0.295	
decade1990	0.004158	0.046035	0.090	0.930	
decade2000	-0.047101	0.038837	-1.213	0.253	
decade2010	-0.038115	0.041242	-0.924	0.377	
decadeOriginal	-0.023437	0.052233	-0.449	0.663	

Topic 2:

Coefficients:					
	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	0.0099379	0.1046898	0.095	0.926	
decade1980	0.1780010	0.1402691	1.269	0.233	
decade1990	0.0040481	0.1354228	0.030	0.977	
decade2000	0.0283488	0.1281543	0.221	0.829	
decade2010	0.0006606	0.1349186	0.005	0.996	
decadeOriginal	0.0174440	0.1805782	0.097	0.925	

Topic 6:

Coefficients:					
	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	0.091907	0.096645	0.951	0.364	
decade1980	-0.080235	0.121557	-0.660	0.524	
decade1990	-0.011616	0.122120	-0.095	0.926	
decade2000	-0.005713	0.117360	-0.049	0.962	
decade2010	0.015913	0.128526	0.124	0.904	
decadeOriginal	-0.034497	0.166339	-0.207	0.840	

Topic 10:

Coefficients:					
	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	0.014330	0.063673	0.225	0.826	
decade1980	0.100051	0.086161	1.161	0.273	
decade1990	-0.008131	0.081957	-0.099	0.923	
decade2000	0.049335	0.078963	0.625	0.546	
decade2010	0.100682	0.089546	1.124	0.287	
decadeOriginal	0.168492	0.123360	1.366	0.202	

Topic 14:

Coefficients:					
	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	0.031379	0.024295	1.292	0.226	
decade1980	0.012347	0.032842	0.376	0.715	
decade1990	-0.001102	0.032054	-0.034	0.973	
decade2000	-0.021410	0.029309	-0.730	0.482	
decade2010	-0.013936	0.031272	-0.446	0.665	
decadeOriginal	0.043936	0.048328	0.909	0.385	

Topic 3:

Coefficients:					
	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	0.069223	0.103147	0.671	0.517	
decade1980	-0.062038	0.132283	-0.469	0.649	
decade1990	0.162286	0.135673	1.196	0.259	
decade2000	-0.045876	0.126579	-0.362	0.725	
decade2010	-0.054402	0.133367	-0.408	0.692	
decadeOriginal	0.001766	0.179566	0.010	0.992	

Topic 7:

Coefficients:					
	Estimate				

Topics (STM)

Second Analysis by Decade

Statistical Significance:

- Coefficients are not statistically significant, suggesting no strong evidence of a difference by decade for topic prevalence.
- Topic 9 (Public Systems) appeared less frequently in the 2010s compared to the 1970s (baseline), but this is only weak.

Magnitude vs. Significance:

- Even with large coefficient estimates (e.g., Topic 5 in 2000: +0.193, Topic 1 in 2000: +0.120), standard errors are large, leading to low t-values and thus are not significant.
- There is too much variability to confirm a clear statistical trend.

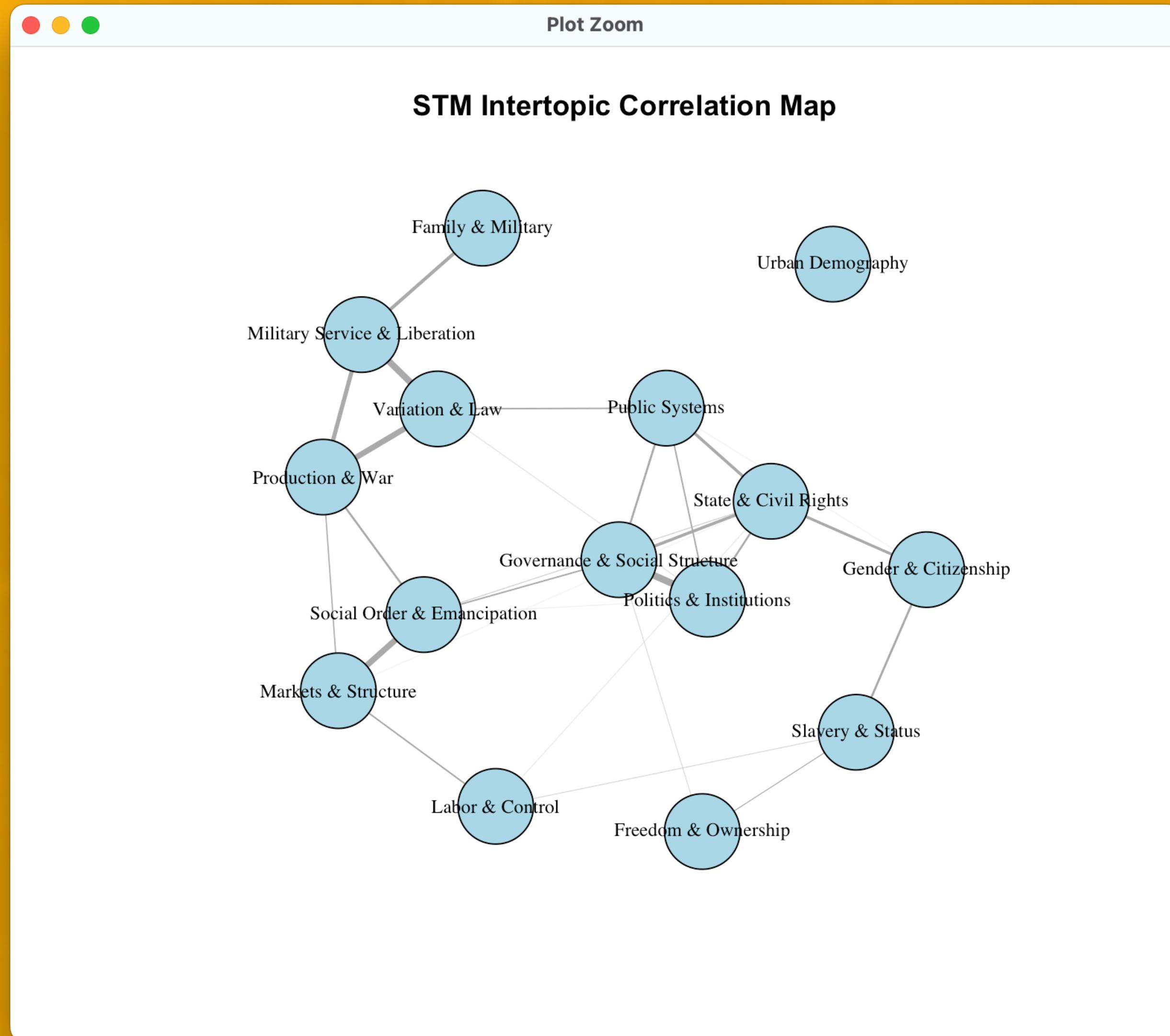
No Clear Decade Pattern:

- Across the topics, coefficients for different decades fluctuate in sign and size.
- No strong temporal trend in topics across the decades.

Did the prevalence of slavery change over time, as captured by STM topics?

- Not significantly. Statistical evidence suggests that topic usage is stable over time.
- Weak trends like Topic 9 decreasing in 2010 raise the question of possible changes, but require additional analysis to confirm.

Intertopic Correlation Map



- **Slavery and Status** is not an isolated topic but is linked to citizenship, etc.
- Centralized topics are legal and political
- **Urban Demography** is isolated
- **Family & Military** is on the periphery
- The cluster on the left focuses on Law, Work and War

Topic Analysis (STM)

Top Three Documents

Topic 1

- Scheidel_Real_Slave_Prices_2005.txt
- Scheidel_Human_Mobility_2005.txt
- Lewis_Varro_Think_Slaves_2013.txt

Topic 2

- Saller-TombstonesRomanFamily-1984.txt
- EBERLE-LandedTradersTrading-2017.txt
- Morley-TransformationItaly22528-2001.txt

Topic 3

- North-PoliticsAristocracyRoman-1990.txt
- Crawford-PublicBuildingRome-1977.txt
- MEIKLE-MODERNISMECONOMICSANCIENT-1995.txt

Topic 4

- Roth_Peculium_Freedom_Citizenship_2010.txt
- Scheidel_Human_Mobility_2005.txt
- North-PoliticsAristocracyRoman-1990.txt

Topic 5

- Morley-TransformationItaly22528-2001.txt
- Scheidel_Human_Mobility_2005.txt
- MacMullen-LateRomanSlavery-1987.txt

Topic 6

- EBERLE-LandedTradersTrading-2017.txt
- WARRY-LegionaryTileProduction-2010.txt
- MEIKLE-MODERNISMECONOMICSANCIENT-1995.txt

Topic 7

- MEIKLE-MODERNISMECONOMICSANCIENT-1995.txt
- Erdkamp-AgricultureUnderemploymentCost-1999.txt
- Scheidel_Real_Slave_Prices_2005.txt

Topic 8

- Erdkamp-AgricultureUnderemploymentCost-1999.txt
- Millar-CondemnationHardLabour-1984.txt
- Scheidel_Real_Slave_Prices_2005.txt

Topic 9

- Crawford-PublicBuildingRome-1977.txt
- The Ancient Economy.txt
- Millar-CondemnationHardLabour-1984.txt

Topic 10

- Lewis_Varro_Think_Slaves_2013.txt
- Millar-CondemnationHardLabour-1984.txt
- The Ancient Economy.txt

Topic 11

- WARRY-LegionaryTileProduction-2010.txt
- Saller-TombstonesRomanFamily-1984.txt
- EBERLE-LandedTradersTrading-2017.txt

Topic 12

- MEIKLE-MODERNISMECONOMICSANCIENT-1995.txt
- Konstan-MARXISMROMANSLAVERY-1975.txt
- The Ancient Economy.txt

Topic 13

- North-PoliticsAristocracyRoman-1990.txt
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Topic 14

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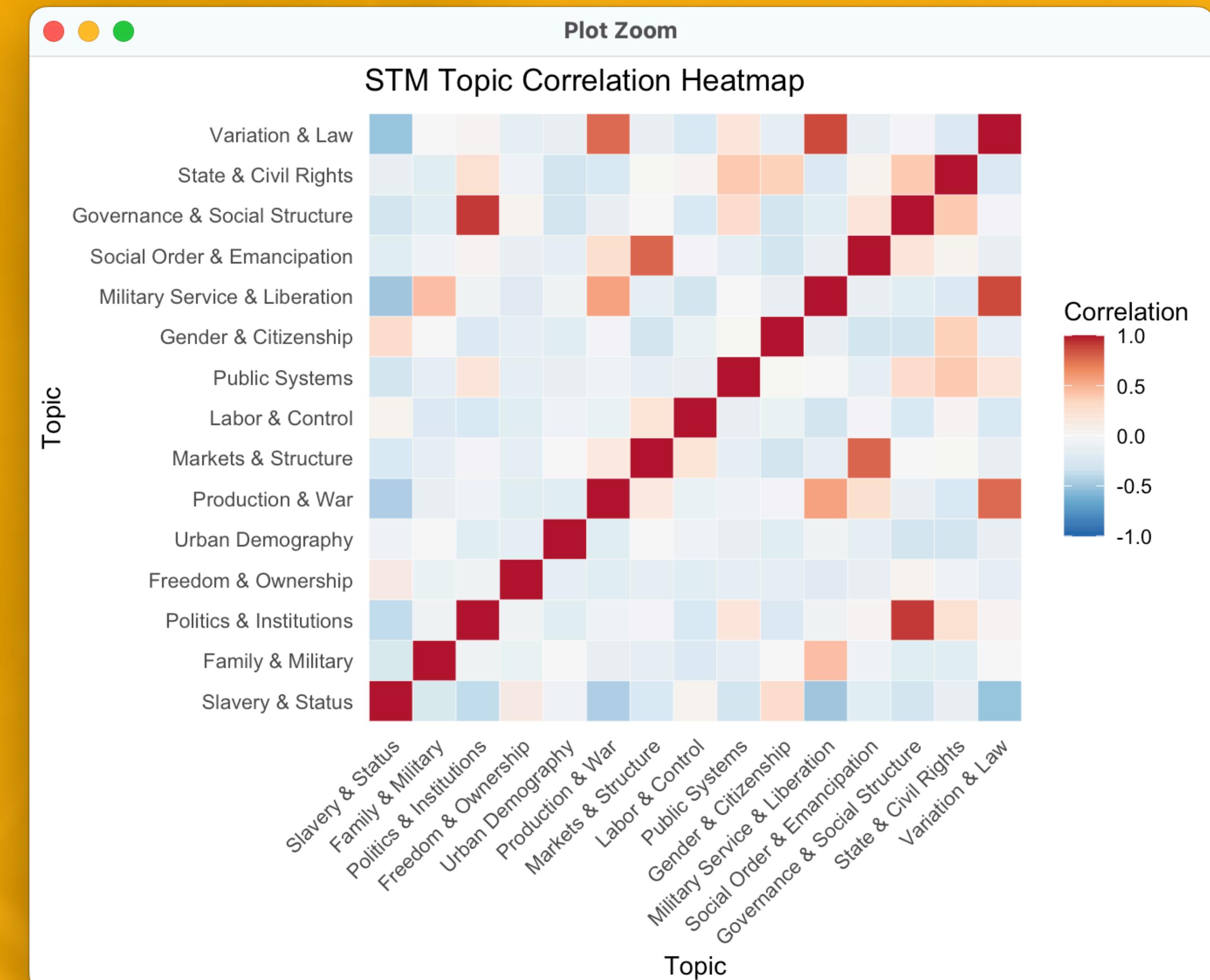
Topic 15

- WARRY-LegionaryTileProduction-2010.txt
- EBERLE-LandedTradersTrading-2017.txt
- Crawford-PublicBuildingRome-1977.txt

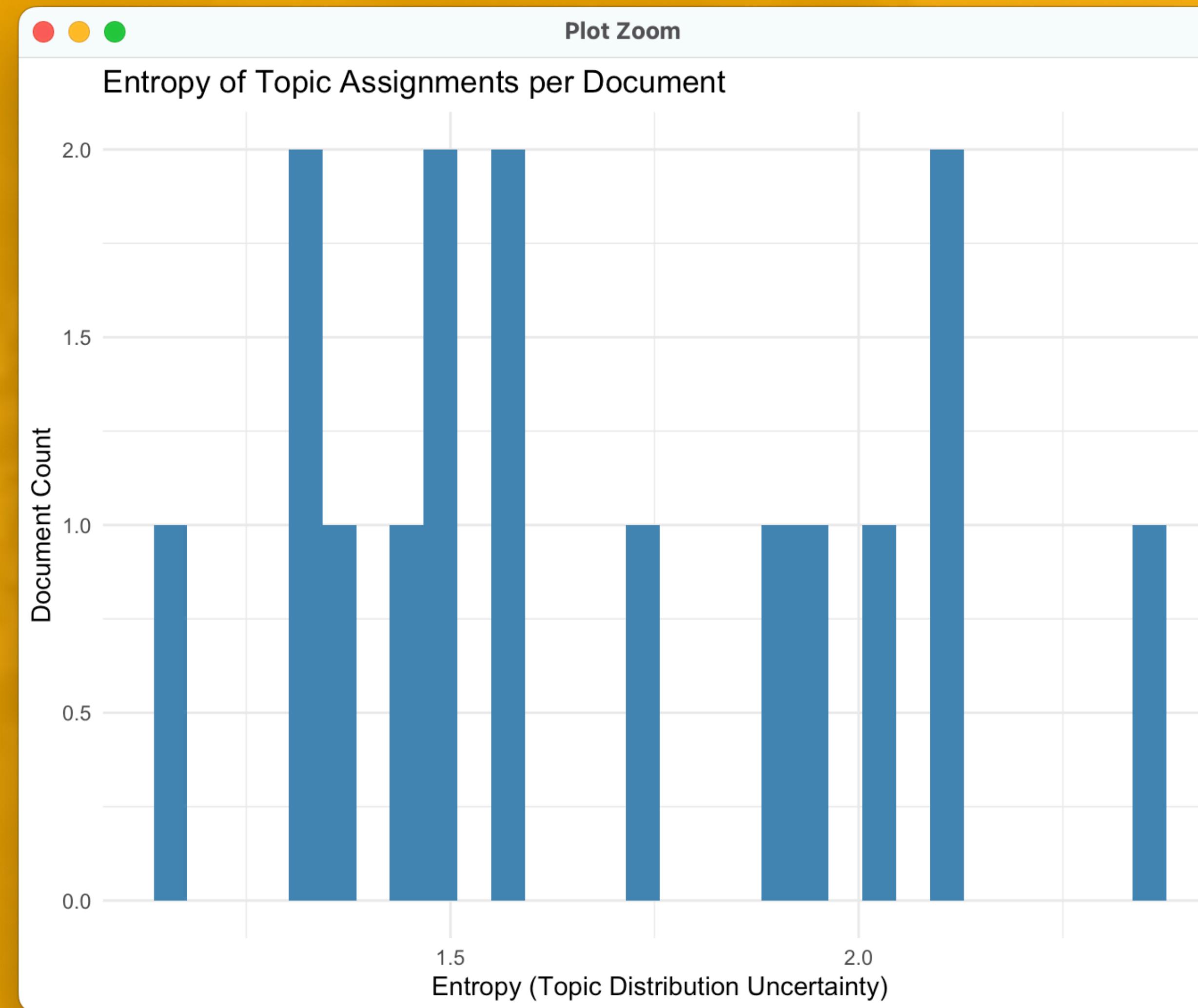
STM Topic Correlation

Clusters of Related Topics:

- Upper-center block: Governance, Politics, State Rights, Emancipation are moderately interlinked, forming a cohesive domain around civic structure and rights.
 - Labor, Markets, and Production topics form a slightly correlated cluster.
 - Military Service & Liberation closer to Social Order & Emancipation than to central economic or governance themes.

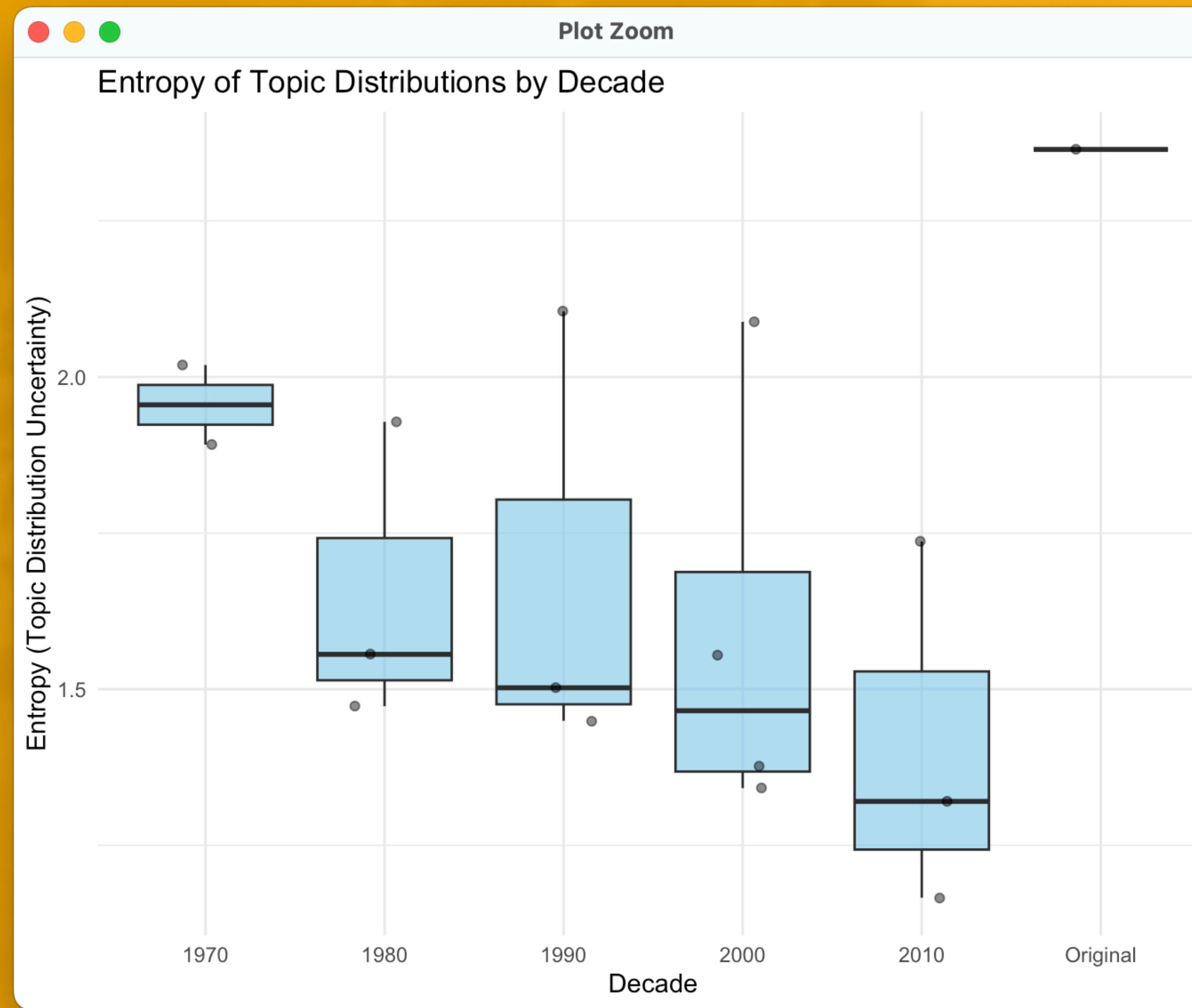


Entropy



Mix of values indicates an appropriate topic model

Entropy



Writing has become more focused and specialized over time

Recap

Academic writing about slavery has changed over time since Finley's *The Ancient Economy* from legal and economic structures to themes of personal agency, resistance, and moral framing with a more neutral analytical tone.

Bibliography

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