Forging the English Ruling Class 1660 – 1714

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Executive Summary

- 17\textsuperscript{th}-century Britain was extremely politically \textit{unstable}. 18\textsuperscript{th}-century Britain was extremely politically \textit{stable}. There are multiple theories to explain this transformation.

- Social network analyses indicate that the British ruling class became steadily more cohesive from 1660 – 1714.

- Linguistic analysis of a large corpus of books published in Britain 1660 – 1700 indicates that literate Britain increasingly expressed itself in more rational and secular language over this period.

- The creation of a more unified, secular and rational ruling class plausibly contributed to the creation of British political stability.
‘The acceptance by society of its political institutions, and of those classes of men or officials who control them’
The Transition to Stability

• Between 1639 and 1653, Britain descended into a series civil wars ultimately rooted in religious conflict
  • Resulted in the deaths of an estimated four per cent of the English population and six per cent of the Scottish population and the only regicide for treason in British history

• In 1660, a weak Catholic-ish monarchy was restored

• In the 1688 Glorious Revolution, a foreign army invaded with broad public support, and with limited bloodshed (in England) installed a Protestant monarchy

• By 1714, Britain had built armed forces of more than 100,00 men, achieved the most rapid growth in government employment in British history, and constructed ‘the most efficient government machine in Europe’

• 18th century Britain displayed ‘adamantine political stability’
Elements of Political Stability in 18th Century England

Plumb argued that the three major factors accounted for this stability

- ‘Single-party government’

- ‘The legislature firmly under executive control’

- ‘A sense of common identity in those who wielded economic, social, and political power’
The Emergence of this Sense of Common Identity

Why did this emerge?

Two (non-mutually-exclusive) hypotheses:

1. Adept political management by the Whig leadership
2. Organic growth of a more unified ruling class
Six Degrees of Francis Bacon (SDFB)

SDFB is a digital reconstruction of the early modern British social network maintained by Carnegie Mellon University Libraries. It includes:

- ~13K person nodes derived from the Oxford Dictionary of National Biography (ODNB)
- ~170K relationships estimated via NLP, reviewed by scholars
- Metadata for nodes
- Start and end dates for edges
Evolution of Elite British Network Modularity: Base Analytical Pipeline

- Used Selenium webdriver to scrape all 171,500 relationships from SDFB

- For each year 1660 to 1714:
  - Extracted all valid nodes (people) and edges (relationships) for that year
  - Used Python Networkx to:
    - Construct a unique graph network for that year
    - Extract communities using Louvain partitioning
    - Calculate network modularity

- Used Python SciPy to estimate the trend using OLS regression between year and modularity
Evolution of the Elite British Social Network

Network modularity declined steadily throughout the period ($p < 0.01$)

Temporary partial re-fractritionalization at the time of the Glorious Revolution
Robustness Check 1: Random Deletion of Identified Edges (Bootstrapping)

This directional result is robust to removal of 50% of relationships

- Analytical pipeline was to repeat the following procedure 100 times:
  - For each year 1660 – 1714:
    - Randomly remove 50% of edges
    - Execute base analytical pipeline to calculate modularity by year
  - Calculate slope of OLS line
Robustness Check 2: Analysis of a Correspondence Network

External validity was tested by applying a similar procedure to a large correspondence network from the same period

- Scraped Early Modern Letters Online (EMLO) website to collect 4,866 letters written between 1660 and 1714 with a British author or addressee

- Two social networks were constructed using this data: one for 1660 – 1688, and the second for 1689 – 1714

- Modularity declined from 0.76 in the earlier period to 0.71 in the later period (p < 0.01), confirming the previous analysis
• Selenium was used to scrape EarlyPrint.org to collect full text for 15,410 English books published between 1660 and 1700

• The text was cleaned (e.g., stopwords were removed) using Python SpaCy

• Fancy version: (i) sentence-vectorize each text; (ii) randomly select 1,000 texts as a training set; (iii) hand classify each of these 1,000 texts as religious or non-religious; (iv) build a machine learning classifier to predict religious / non-religious class label and confirm statistical skill in predicting label (F1 score); (v) apply this model to all sentences in each of the remaining 14,410 texts; (vi) calculate the average religiosity score for the texts published in each year; and (vi) estimate OLS regression between year and religiosity score in the 14,410 non-training texts

• Repeat steps iii – vi for emotional vs. non-emotional texts
Selenium was used to scrape EarlyPrint.org to collect full text for 15,410 English books published between 1660 and 1700

The text was cleaned (e.g., stopwords were removed) using Python SpaCy

The proportion of words that were ‘God’, ‘Jesus,’ or ‘Christ’ was calculated for each text, and this was termed the text’s ‘religiosity score.’

An ‘emotion score’ was calculated for each text based on the proportion of words in the text that were present in the NRC Emotion Lexicon

Average emotion and religiosity scores were then calculated for all books published in each year

Estimated OLS regression between year and each score using Python SciPy
Evolution of English Books: Summary of Results

**English books became materially less religious and emotional**

- Both religiosity score ($p = 0.01$) and emotion score ($p = 0.04$) show declining trends over time 1660 – 1700

- Fuzzy matching plus hand curation between (i) SDFB node metadata and (ii) book authors was used to identify group membership of authors (i.e., Jacobites, Whigs)

- These trends are not only statistically significant, but also represent practically significant change in both attributes:
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Thank You

Questions?