



Slides reader

Second Workshop on Computational Drama Analysis: Achievements
and Opportunities (Berlin, 03.09.2025)

Potsdam-Berlin, 2025



UNIVERSITÄT
HEIDELBERG
ZUKUNFT
SEIT 1386

Computational Drama Analysis Workshop, DraCor Summit
Benjamin Krautter (Benjamin.Krautter@gs.uni-heidelberg.de)
03.09.2025

The Case of Heinrich von Kleist: Methodological Consequences of Computational Approaches to Literary History



Heinrich von Kleist (1777—1811)

List of Kleist's plays:

- Die Familie Schroffenstein (1803)
- Robert Guiskard (1808 fragment)
- Der zerbrochne Krug (1808) [The Broken Jug]
- Amphityron (1808)
- Penthesilea (1808)
- Die Hermannschlacht (1809)
- Prinz Friedrich von Homburg (1811) [The Prince of Homburg]

Heinrich von Kleist (1777—1811)

According to current research:

- Kleist is characterized as “enigmatic loner”, “outsider”, “classless man” and “one of the ‘great individuals’ in German literature around 1800”
- There is a general unease to attribute Kleist’s texts to a literary period or movement

Goal: explore the potential of computer-aided analyses for constellations of literary history, i.e., determine similarities and differences of Kleist’s plays and those of his contemporaries

Operationalizing literary periods (I)

“[...] it is particularly promising to explain literary periods as ‘cluster concepts’, i.e. by specifying a ‘bundle’ of fundamental characteristics: Whether a text belongs to a literary period is decided in this case by recourse to a possibly longer, but basically self-contained list of characteristics which, taken individually, are not necessary, but in certain combinations are sufficient for the classification in question.”

Kindt 2015: Epoche machen! Zur Verteidigung eines umstrittenen Begriffs der Literaturgeschichte, S. 15 [translation, B. K.].

Possible **features** to establish a literary period according to Kindt: **Thematic, conceptual, stylistic** or similar characteristics of texts

Operationalizing literary periods (II)

Problems/Challenges:

- How do you decide on the characteristics you want to measure?
- There is no proper gold data
- Challenging and time consuming annotation task

Operationalizing literary periods (III)

Characteristics	Dimensions	Implementation	Measures
Conceptual Characteristics (a)	Structure	Elements derived from TEI encoded dramatic texts	<ul style="list-style-type: none"> length of character speech length of stage directions Number of appearing characters
	Plot	Drama change rate to capture one aspect of the unity of plot	<ul style="list-style-type: none"> Hamming distance Modified Levenshtein distance
	Character Constellation	Co-Occurrence Networks based on character configuration (from TEI encoded dramatic texts)	<ul style="list-style-type: none"> Degree Weighted Degree Betweenness Centrality Closeness Centrality Path Length Density

Operationalizing literary periods (IV)

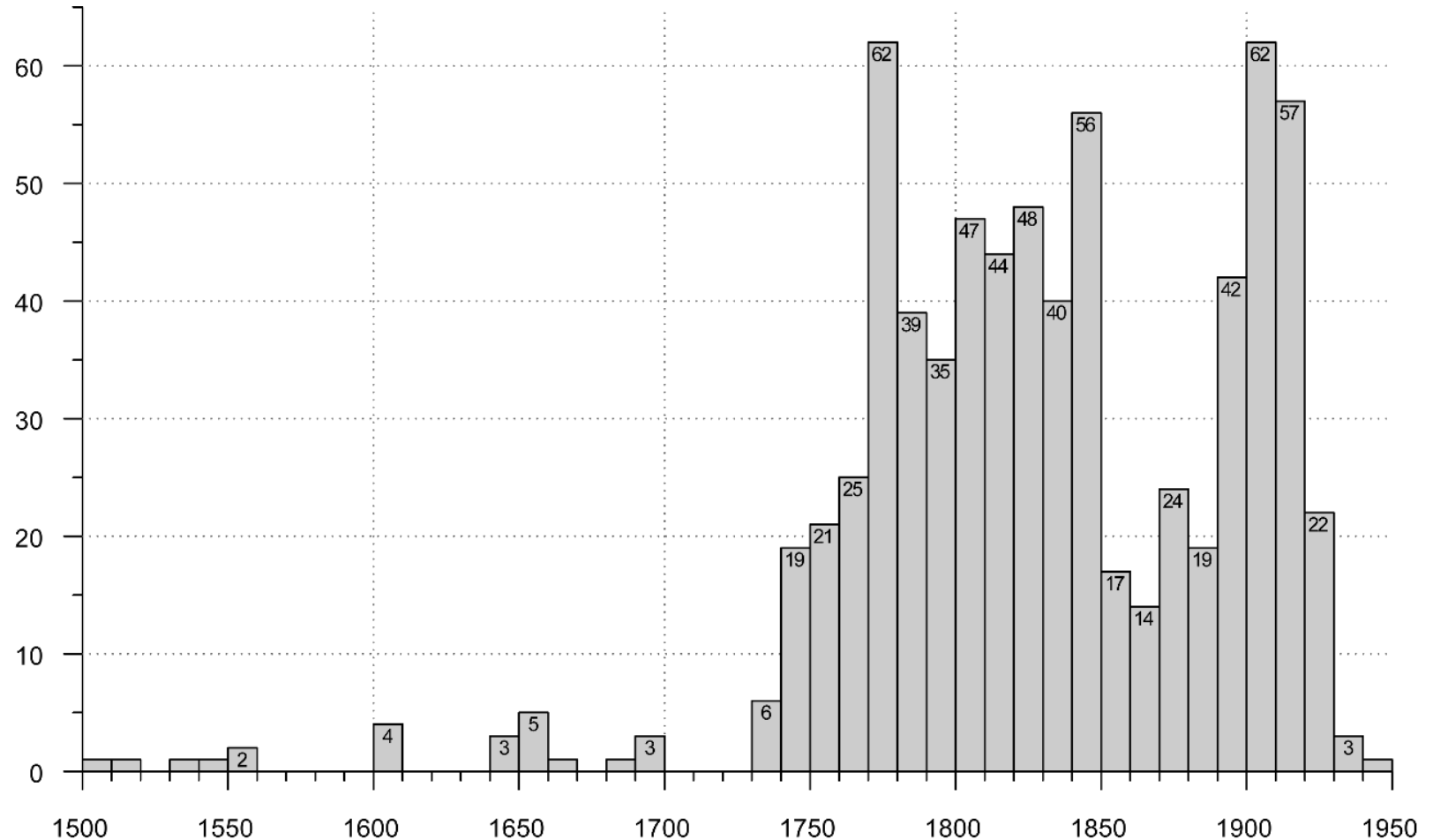
Characteristics	Dimensions	Implementation	Measures
Stylistic Characteristics (b)	Stylometry	Bag of words, 1000 most frequent words	<ul style="list-style-type: none"> ▪ z-scores of relative frequencies;
	Peculiarities of character speech	Complexity of vocabulary; Length of character speech	<ul style="list-style-type: none"> ▪ Average type-token ratio (1000 tokens) ▪ Average utterance length (in tokens)
Thematic Characteristics (c)	Topic Modeling	LDA with Gibbs-sampling, 30 topics. Preprocessing: Texts divided into segments of 1000 tokens, only nouns, adjectives and verbs as pos; lemmatizing, lowercasing, stopwords removed	<ul style="list-style-type: none"> ▪ Posterior probability of topics T1–T30

Heuristic: four literary time frames

- 1730 to 1785 (142 plays)
- 1786 to 1832 (194 plays)
- 1833 to 1881 (137 plays)
- 1882 to 1940 (161 plays)

Plays were removed when...

- shorter than 2000 words
- written before 1700
- consist of only one scene



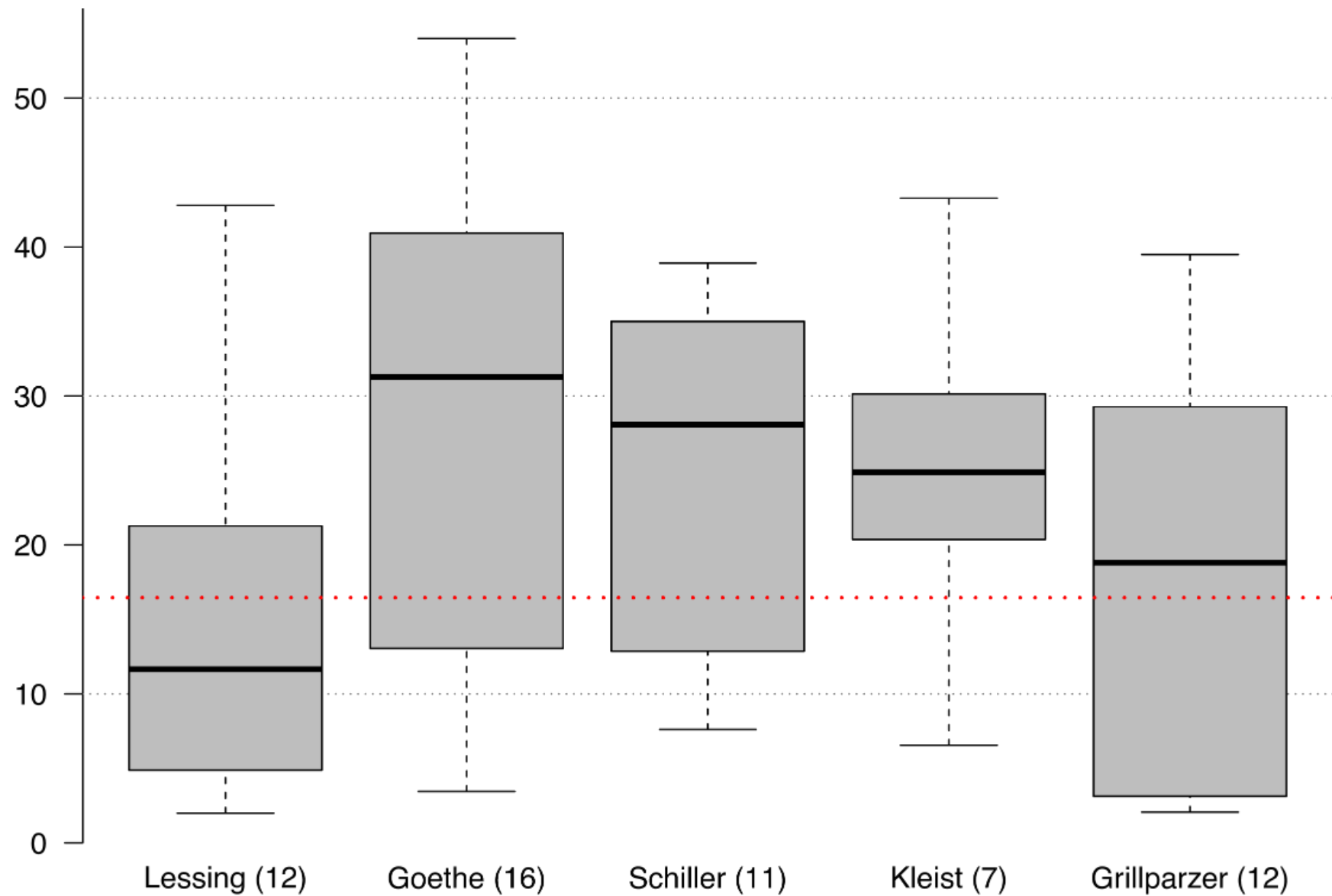
Number of plays that are contained in the *German Drama Corpus* per decade (1500 to 1950).

	1730–1785	1786–1832	1833–1881	1882–1940
Model	F1	F1	F1	F1
RF (Network metrics)	.389	.323	.309	.443
RF (Topics T1–T30)	.786	.674	.580	.795
RF (Stylo S1–S20)	.656	.617	.560	.759
RF (full model)	.795	.714	.667	.849
SVM (Network metrics)	.404	.264	.272	.456
SVM (Topics T1–T30)	.787	.630	.547	.787
SVM (Stylo S1–S20)	.656	.545	.529	.719
SVM (full model)	.809	.681	.619	.827

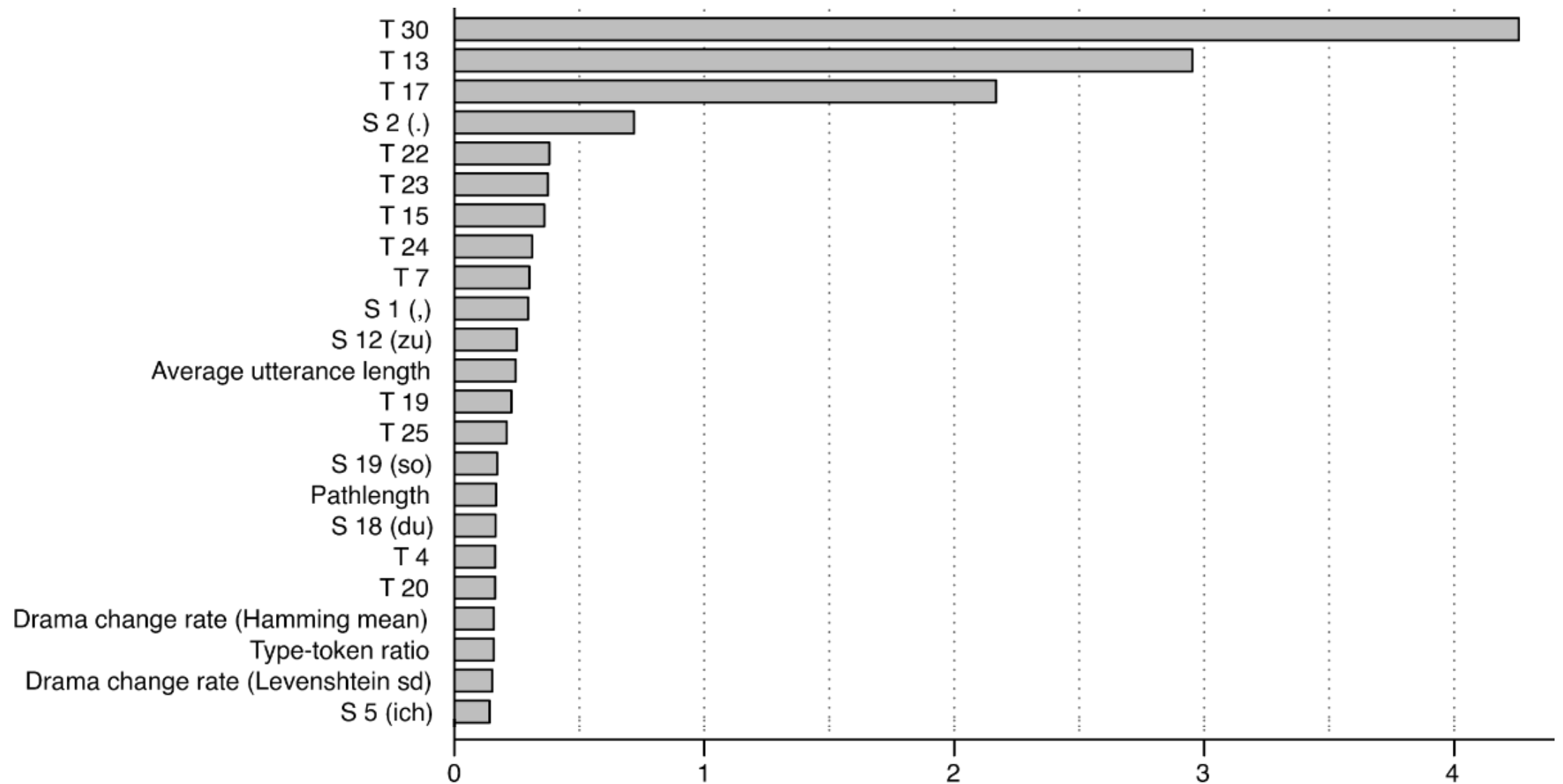
Classification Results per class: four-label task, 5-fold cross validation, 10 repeats, smote-sampling; two models: Support Vector Machine (SVM) and Random Forest (RF); evaluation metrics: F1 score.

Model	RMSE	MAE	R ²
Baseline (mean years)	52.7	44.7	-
LR (full model)	27.0	20.9	0.74
SVM (full model)	27.7	21.5	0.72
RF (full model)	26.2	20.4	0.75

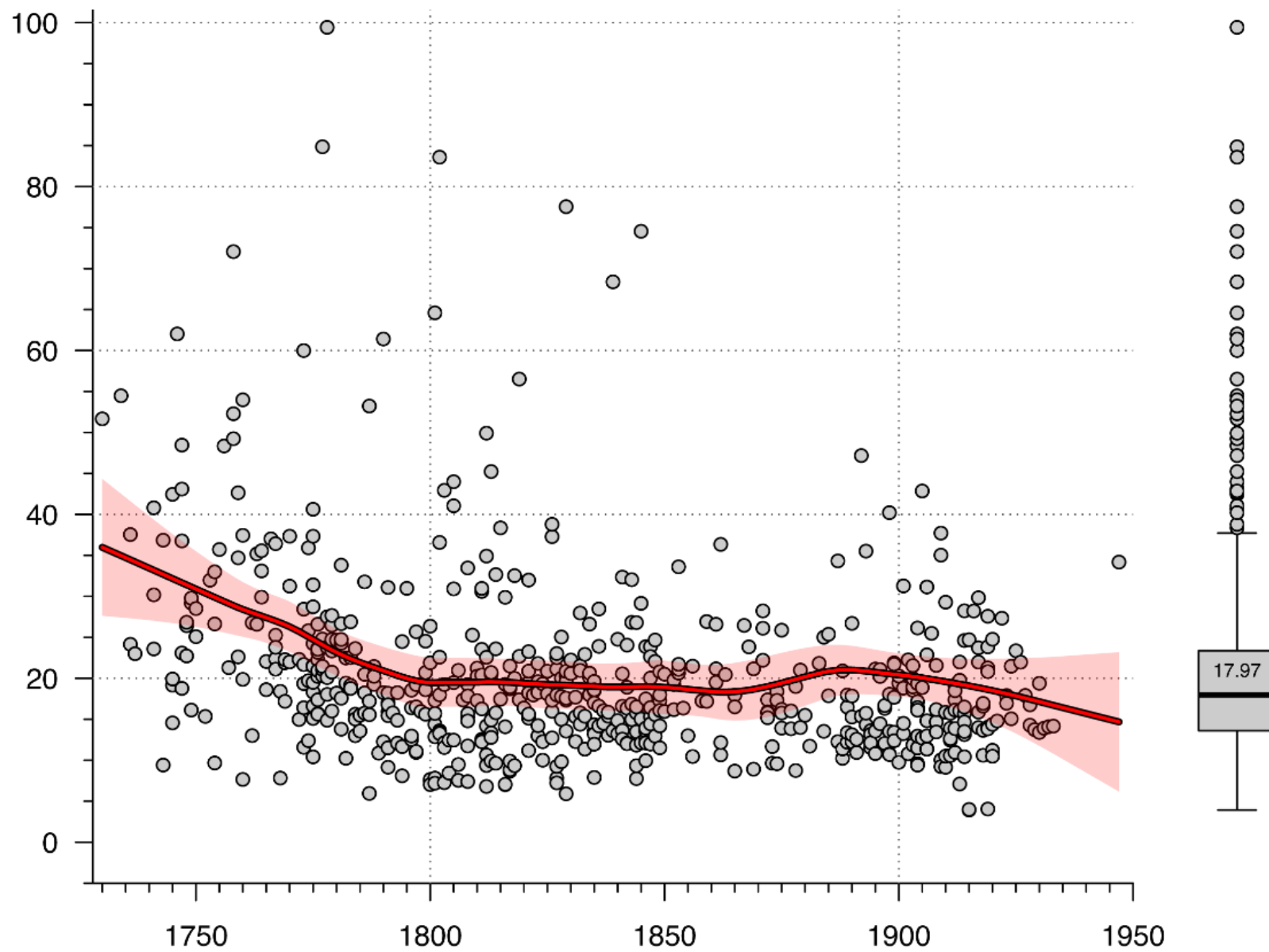
Regression model predicting year of publication: 5-fold cross validation, 10 repeats; three methods: Linear Regression (LR), Linear Support Vector Machine (SVM), Random Forest (RF); evaluation metrics: Root mean squared error (RMSE), Mean absolute error (MAE), R².



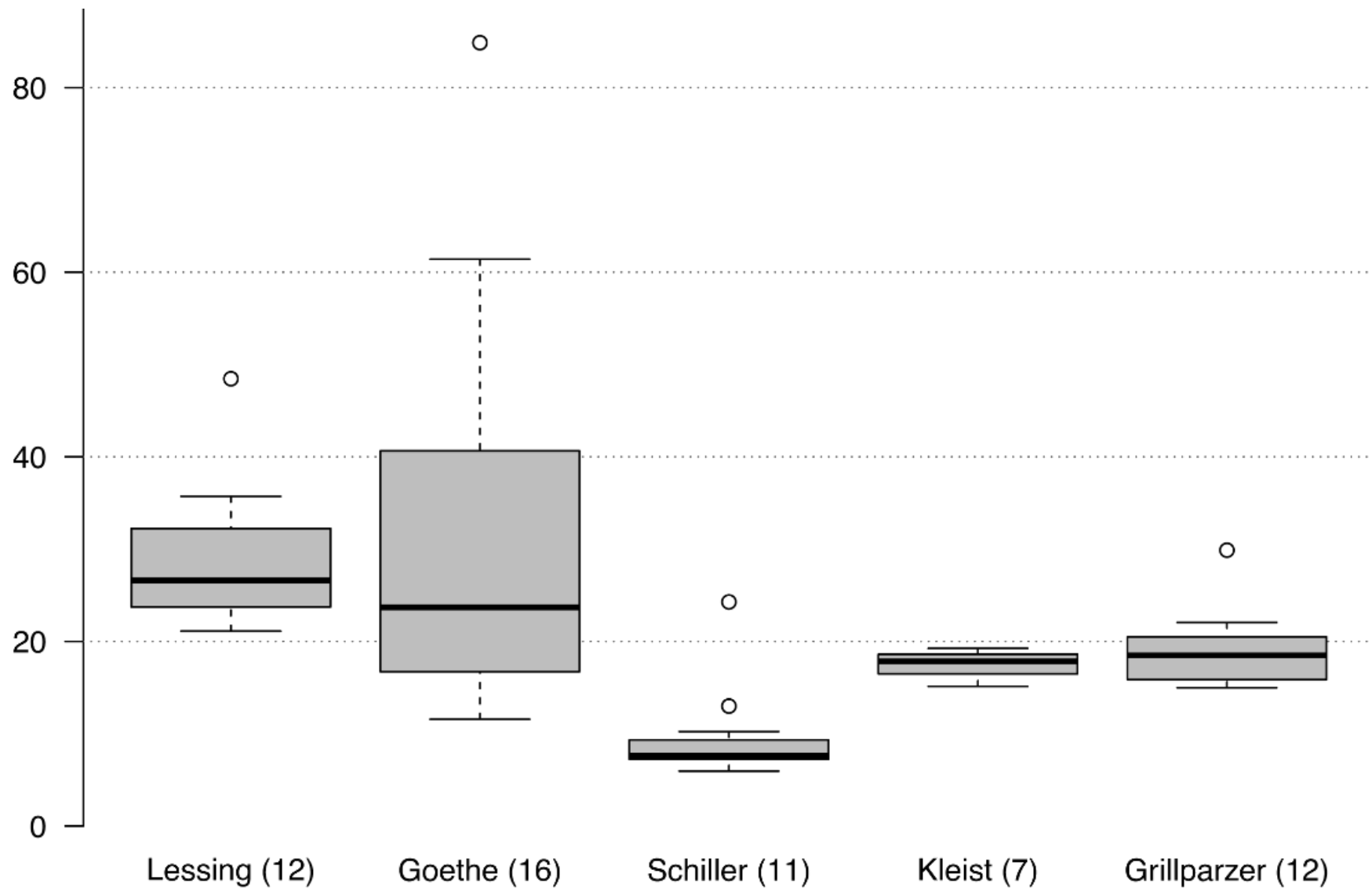
Boxplots representing the **absolute errors** for plays of Lessing, Goethe, Schiller, Kleist and Grillparzer; red dots represent the median absolute error of all 634 plays.



Feature (or variable) importance of the Random Forest regression model.



Values of the characters' **average utterance length** in 634 plays; in red: LOESS curve (degree = 1, span = 1/3), confidence interval (95%).



Boxplots representing the **average utterance length** in the plays of Lessing, Goethe, Schiller, Kleist and Grillparzer

Thank you for your interest!

Mapping the Dramaturgical Arc: Computational Approaches to Shakespeare

Second Workshop on Computational Drama Analysis

03. 09. 2025, Berlin

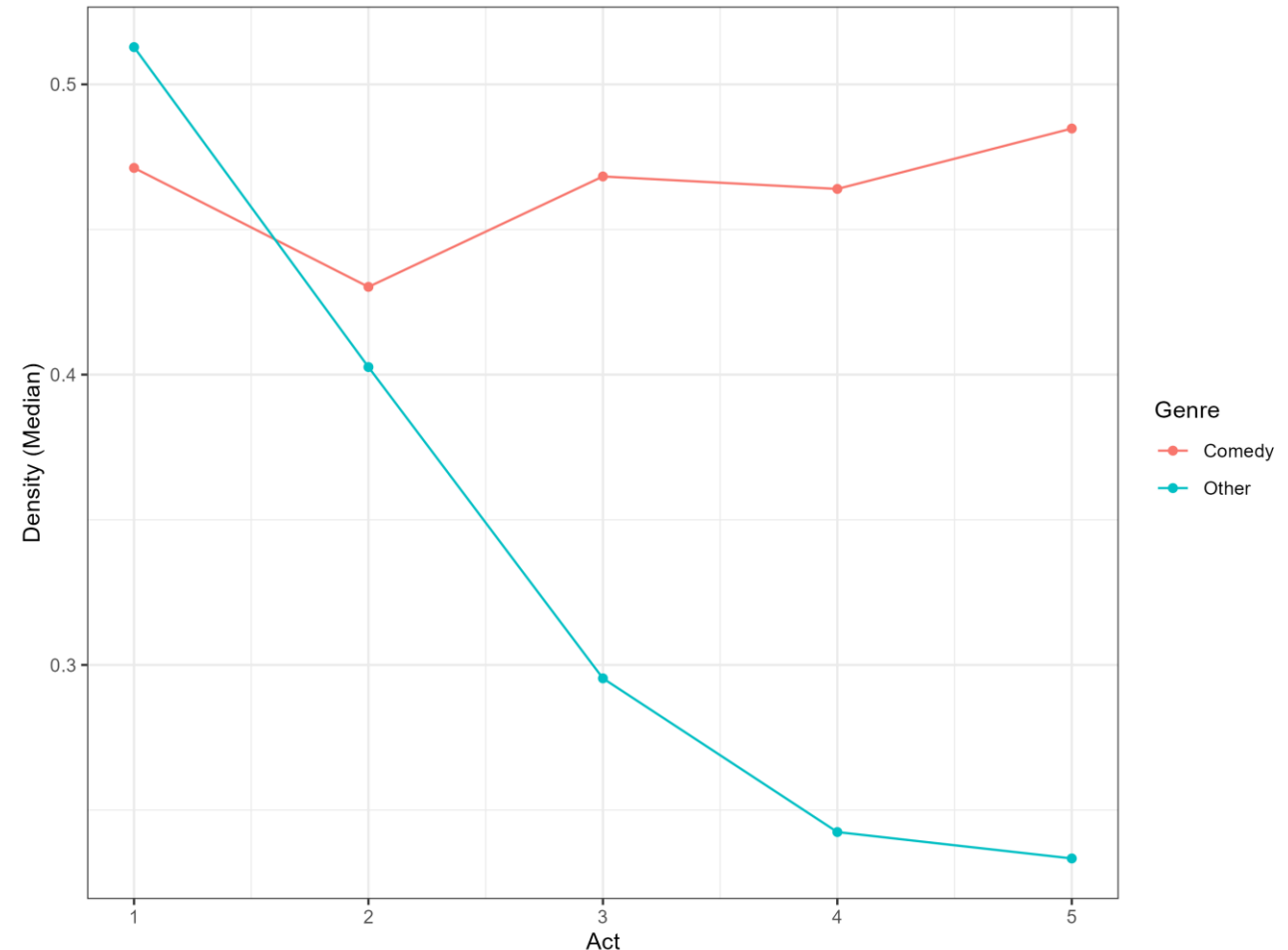
Botond Szemes

Narrative arc

- Seemingly natural property of every narrative
- Can we analyse dramati texts from a narratological point of view?
 - Presentation and not narration
 - But like all narratives, drama involves the selection and ordering of events into causal and temporal sequences (Levenson 2000: 40), and the arcs of the presented stories can therefore be analyzed accordingly. (also Fludernik 1996)
- What is narrative arc? Not clear, especially when we try to operationalize the concept
 - Combination of different approaches

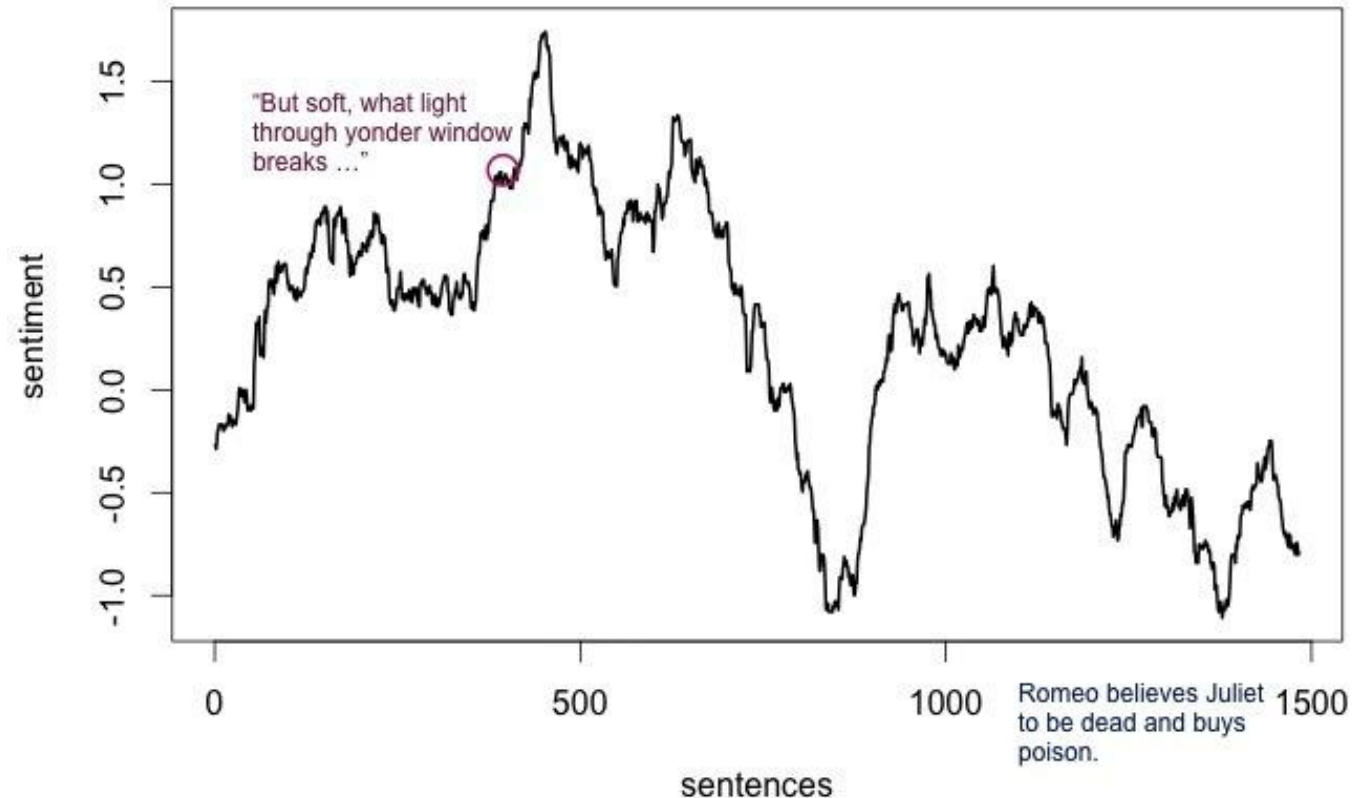
Cumulative changes in density of character networks

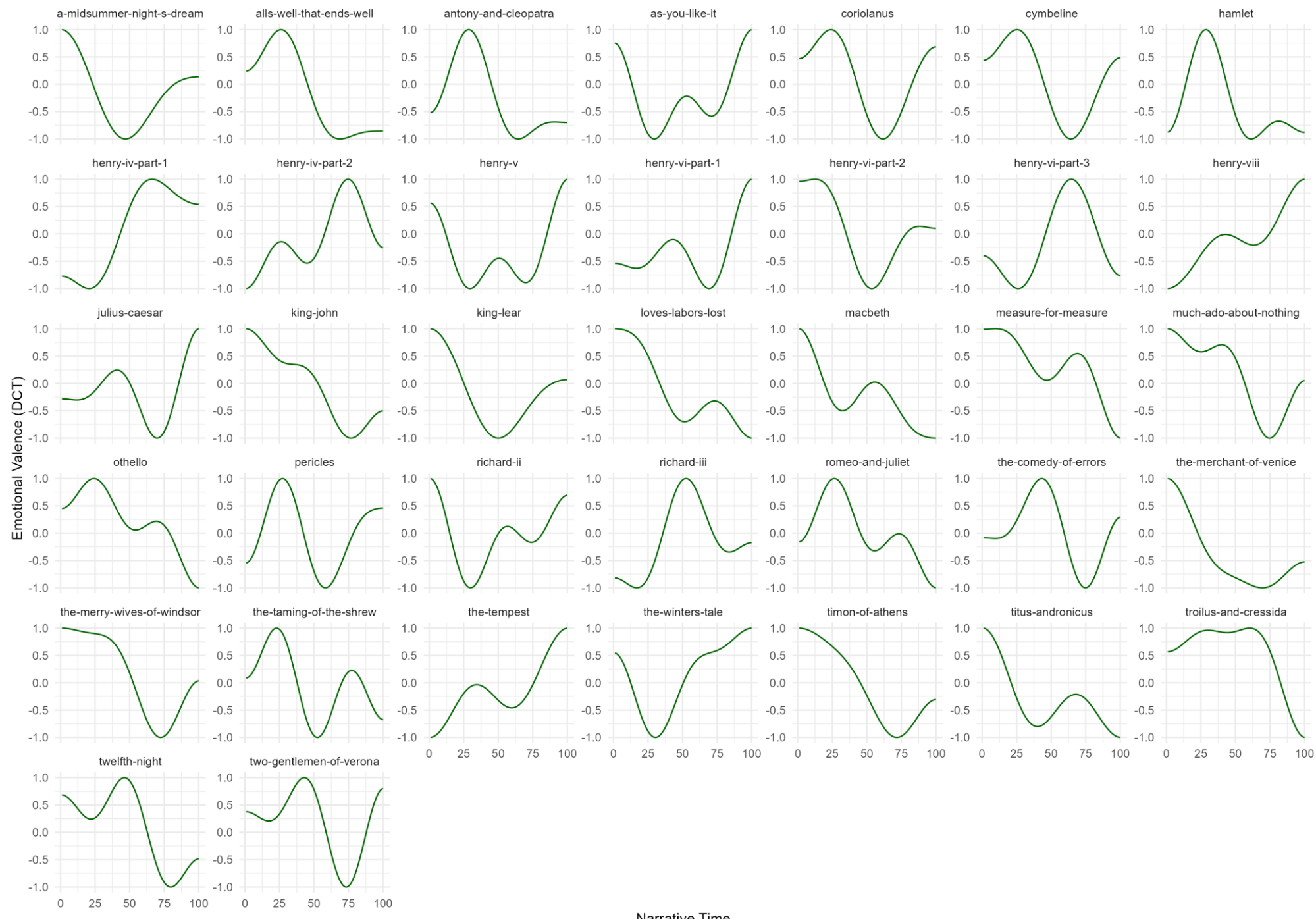
- Comic plots tend to be characterized by the formation of increasingly dense communities
- Tragic plots show a pattern of gradual disintegration (which can be a cause and not the result of tragic ending)
- Szemes, „Temporal Aspects of Structural Differences in Dramatic Genre”, *Zfdg*, 2025: https://zfdg.de/2025_007



Sentiment arc

- *syuzhet* package by Matthew Jockers
 - Debate: Swafford 2015, Underwood 2015
 - *Romeo and Juliet* – typical tragedy?



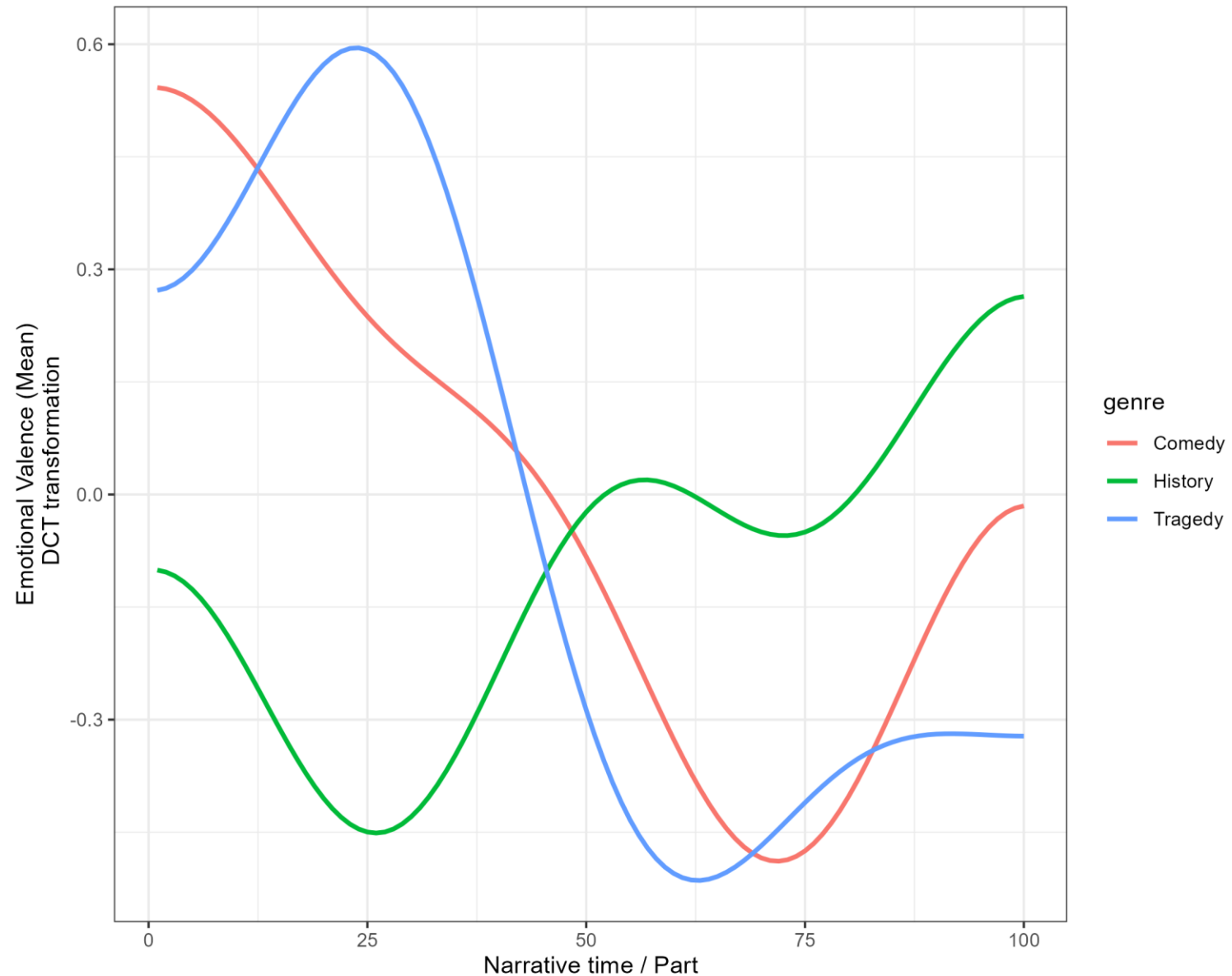


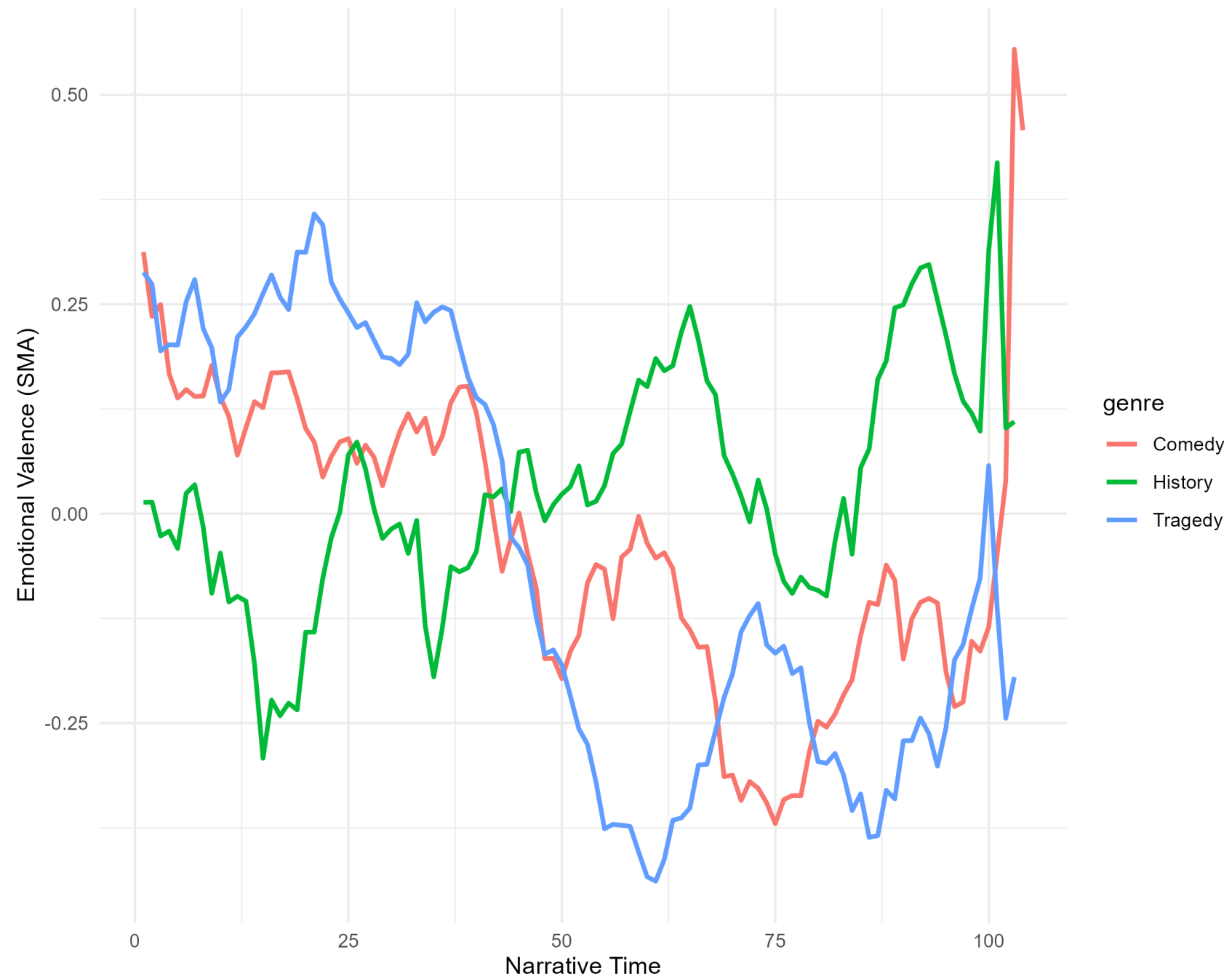
Sentiment arc

- No difference between comedies and tragedies
 - Perhaps sentiment analysis is not even suitable for identifying emotional changes
 - Emotions in drama are not conveyed solely through language
 - Emotional expression and reception were shaped by different cultural and rhetorical norms in the 16th century
 - Or: the integration and disintegration of communities along similar dramaturgy (increasing misfortune, suspense)
 - Participating in a comic community is also not easy or joyful
 - The disappearance of dissimulation (mainly tragedies)

Sentiment arc

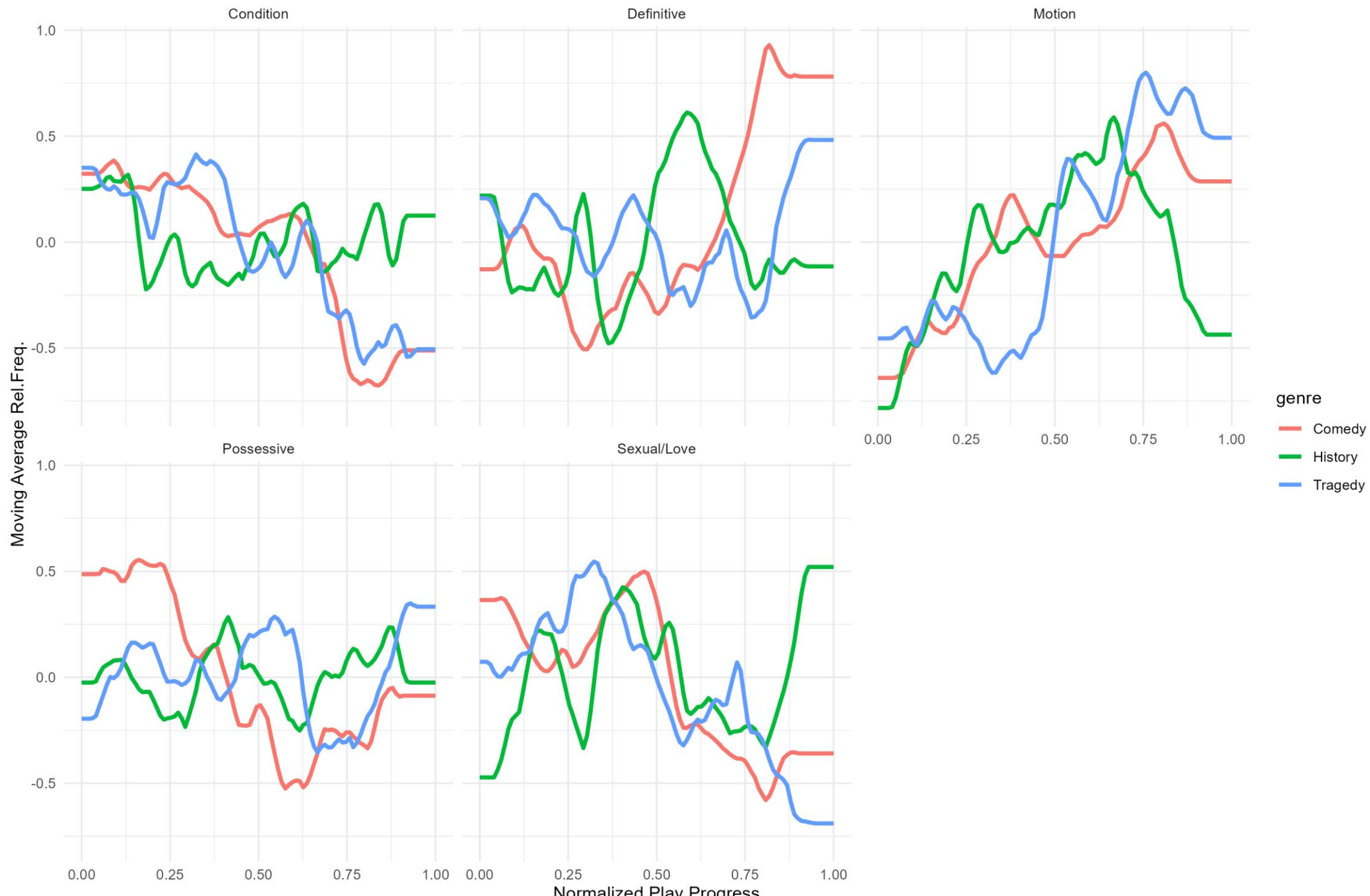
- Histories show different arc:
 - The rise not the fall of the main character
 - Social norms and idea of a community are preserved





Semantic changes

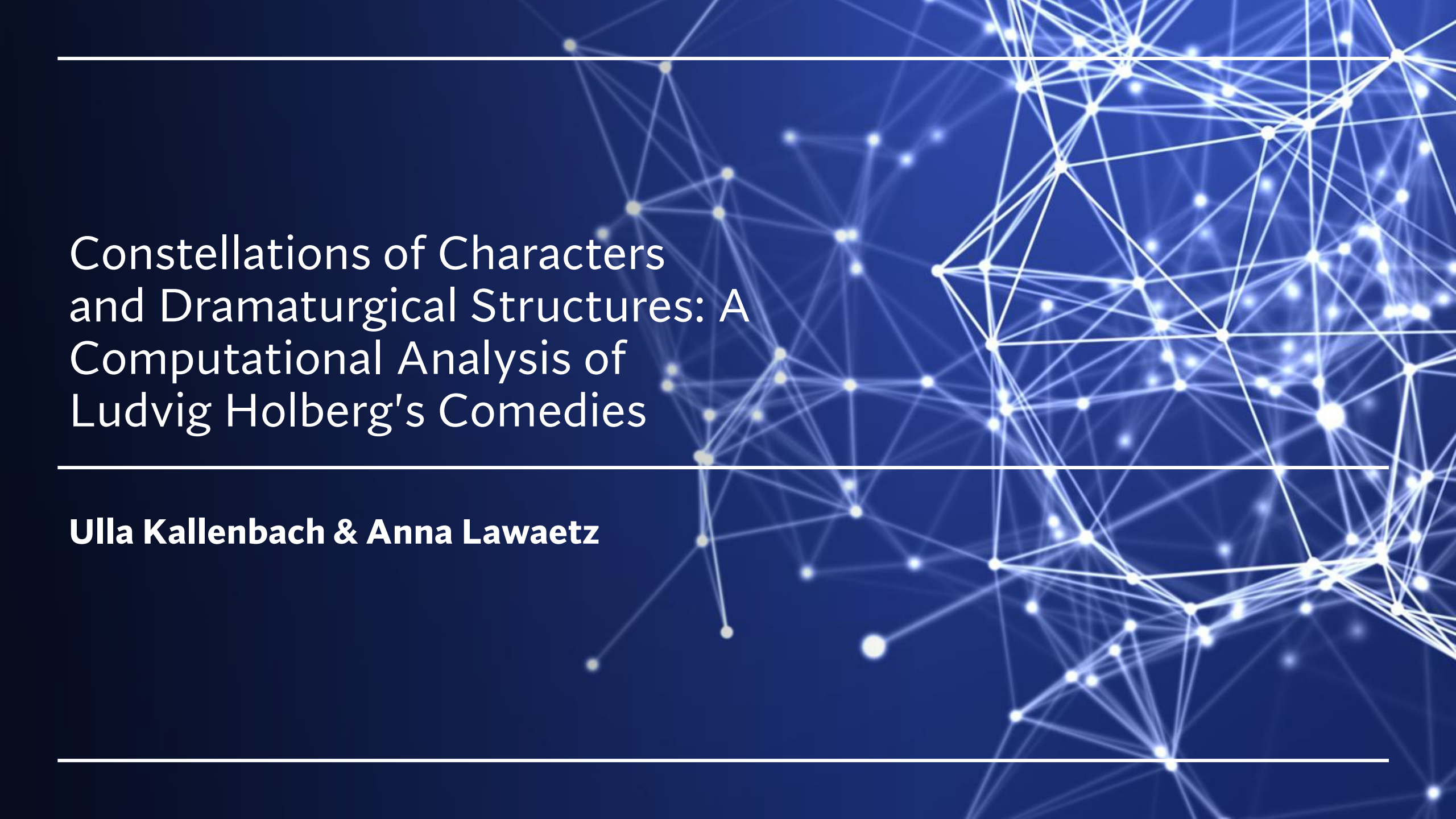
- **Definite determiners** that help specify nouns and/or anchor meaning in context: *the, this, that, these, those, yon, yonder*.
- **Possessive pronouns**: *my, your, his, her, our, their, thy, thine, mine, yours, hers, ours, theirs, its*.
- Modal verbs, adverbs, conjunctions related to **condition and possibility**: *can, could, if, may, maybe, might, perhaps, should, unless, would*.
- Semantic category of '**Sexuality and Intimate Love**': *bawd, bed, bedfellow, chastity, consummation, copulation, court, doxy, embrace, embraces, embracing, gay, harlotry, hug, kissing, kisses, lechery, lecherous, love, lover, lovers, loves, mate, mated, minx, paramour, paramour, pandar, prostitute, seduce, seduced, seducing, sleeping, spinsters, suitor, sweetheart, virgin, virgins, wooer, wooers*.
- Semantic category of '**Bodily motion**': *abroad, barge, base, borne, bring, bring, brings, brought, car, carriages, carry, chariot, cities, come, countries, countrymen, course, depart, dispatch, enter, estate, fall, fell, fetch, flight, fled, fore, follow, followes, forth, forward, fro, go, going, goes, gone, ground, hang, harbours, held, heres, hence, hid, hither, holds, lay, leapt, left, march, meet, met, motion, north, outward, past, passe, place, ports, pound, presence, quick, region, return, rise, run, send, set, shake, ship, sit, sits, stand, stands, stay, steward, still, stood, territory, thence, throw, thrust, top, transport, verges, walked, went, wherein, yelder, yielding, yields, yonder*.



Semantic changes

- In some semantic fields and their progression, comedies and tragedies do not diverge significantly. Both genres show a gradual marginalization of explicit references to sexuality, a decline in the expression of possibility or conditionality, and a growing emphasis on general bodily movement.
- Similarity in discourse developement, but in different social context
- Comedies: stabilizing of identity, canalization of individual desires into communal structures, reduction the imaginative space for subversion → Foucaultian operation of power (homogenization and normalization)

Thank you for your attention!



Constellations of Characters and Dramaturgical Structures: A Computational Analysis of Ludvig Holberg's Comedies

Ulla Kallenbach & Anna Lawaetz

Pilot Project: *Theatre Archives in the Age of Digitalization in Teaching and in Research*

Annelis Kuhlmann, Aarhus University

Ulla Kallenbach, University of Bergen

Anna Lawaetz, Royal Danish Library

Birthe Aagesen, Centre for Educational
Development, AU

Per Møldrup-Dalum, KB

Bolette Ammitzbøll Jurik, KB

DeIC (DeiC - Danish e-Infrastructure Cooperation)
National Cultural Heritage Cluster, The Royal
Danish Library: National eScience

AU EDU-IT

Our case

Ludvig Holbergs Writings:
<http://holbergsskrifter.dk/>

<http://holbergsskrifter.dk/holberg>
=
[public/view?docId=adm/main.xml
&lang.set=en](http://holbergsskrifter.dk/public/view?docId=adm/main.xml&lang.set=en)

COMOE- DIER

Sammenfrevne

for

Den nye oprettede

Danske Stue-Blads

Med

Hans Mickelsen

Borger og Indvaaner i Callundborg.

Med

Just Justsens Portale

Første Tome.



Tryckt Aar 1723.



Ludvig Holberg 1684-1754

Combined dramaturgical and historical analysis with digital approaches

Spatiality

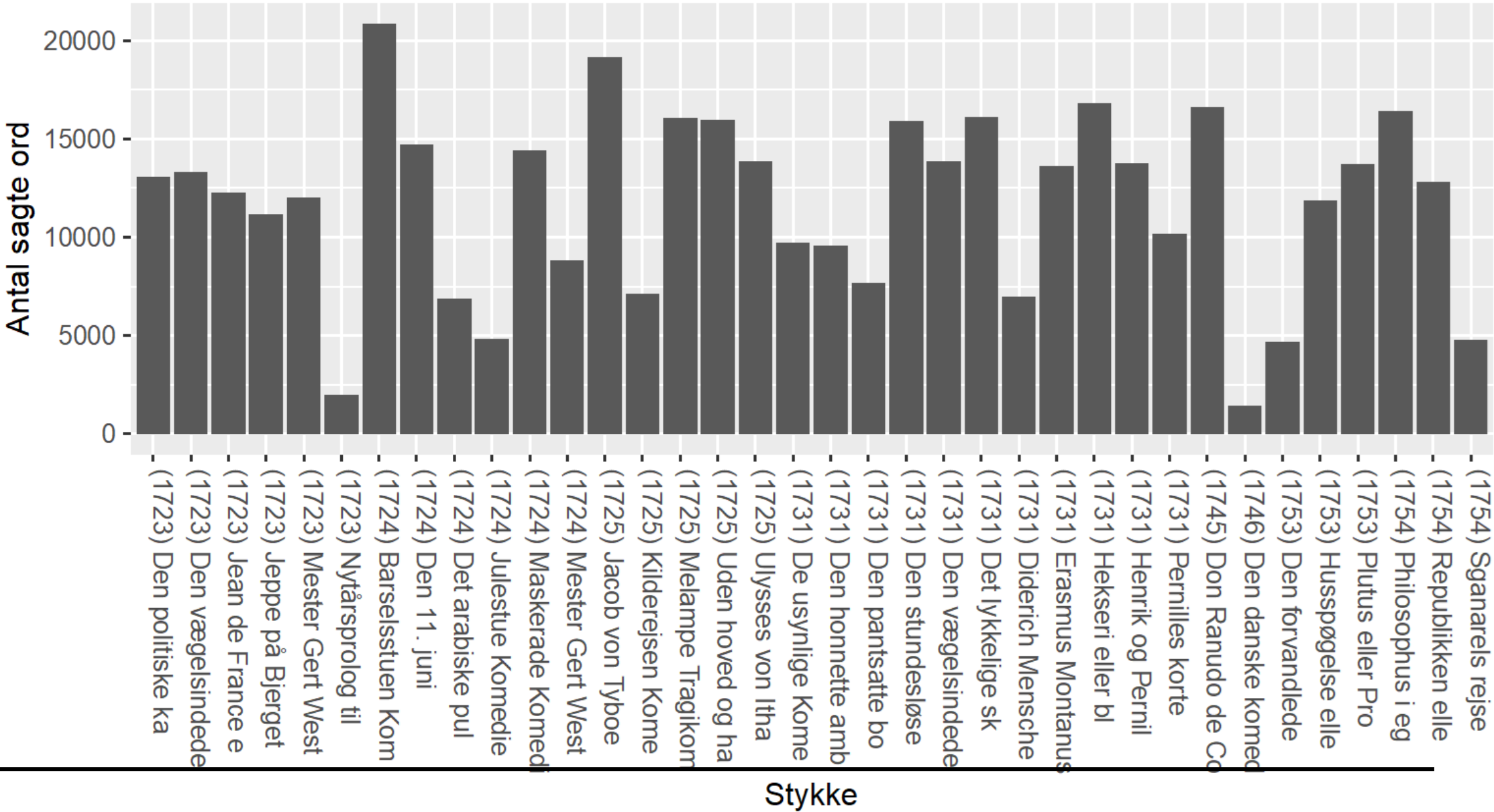
Scenic presence framed by appearance and
disappearance

Who is visible to whom? Who can hear what is
said in the scene? What does it signify?

Awareness of theatricality

Alle stykker
Antal Ord

Words
spoken
all plays



Levels of presence

- Physical
- Verbal
- Imagined



Levels of presence in the drama text: Between close and distant reading[†]

Ulla Kallenbach [✉](#) Anna Lawaetz [✉](#)

First published: 24 June 2023 | <https://doi.org/10.1111/oli.12399>

[†] Funding information

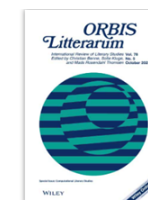
This work was supported by Aarhus University and the Danish e-Infrastructure Cooperation (DeIC)/Kulturarvcluster.dk.

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Abstract

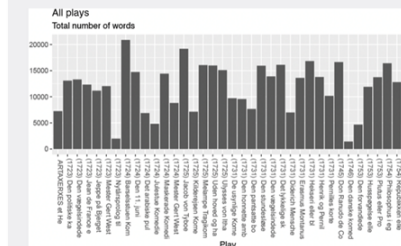
Digital studies of drama have tended to emphasise the written text and network analyses. As theatre scholars, we have approached the field from a different perspective by focusing on levels of presence. This includes the embodied presence of not only the speaking characters, but also the non-speaking characters and the imagined characters mentioned by characters present on stage. This in turn includes another embodied presence, namely that of the audience, which actively engages with the text in performance and gives presence to these imagined characters. We also emphasise the implicit performance, the spatiality of the play and the maintenance of the temporal dramaturgical structure. The study is based on the 37 plays of the Danish-Norwegian playwright Ludvig Holberg (1684–1754), published during the period 1723–1754. Holberg's comedies were heavily influenced by Italian *commedia dell'arte* and stock characters, or masks, were central to his plays. In this article, we discuss the question of how we can analyse levels of presence in drama texts via digital drama analysis, both from a historical and dramaturgical point of view. Our article points to a number of potentials as well as shortcomings of digital drama analysis and to the necessary synergy of close and distant reading.



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Pages 401-420

[Figures](#) [References](#) [Related](#) [Information](#)

FIGURE 1

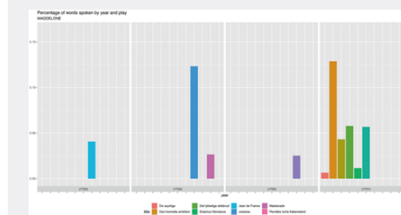


All plays, number of words spoken.

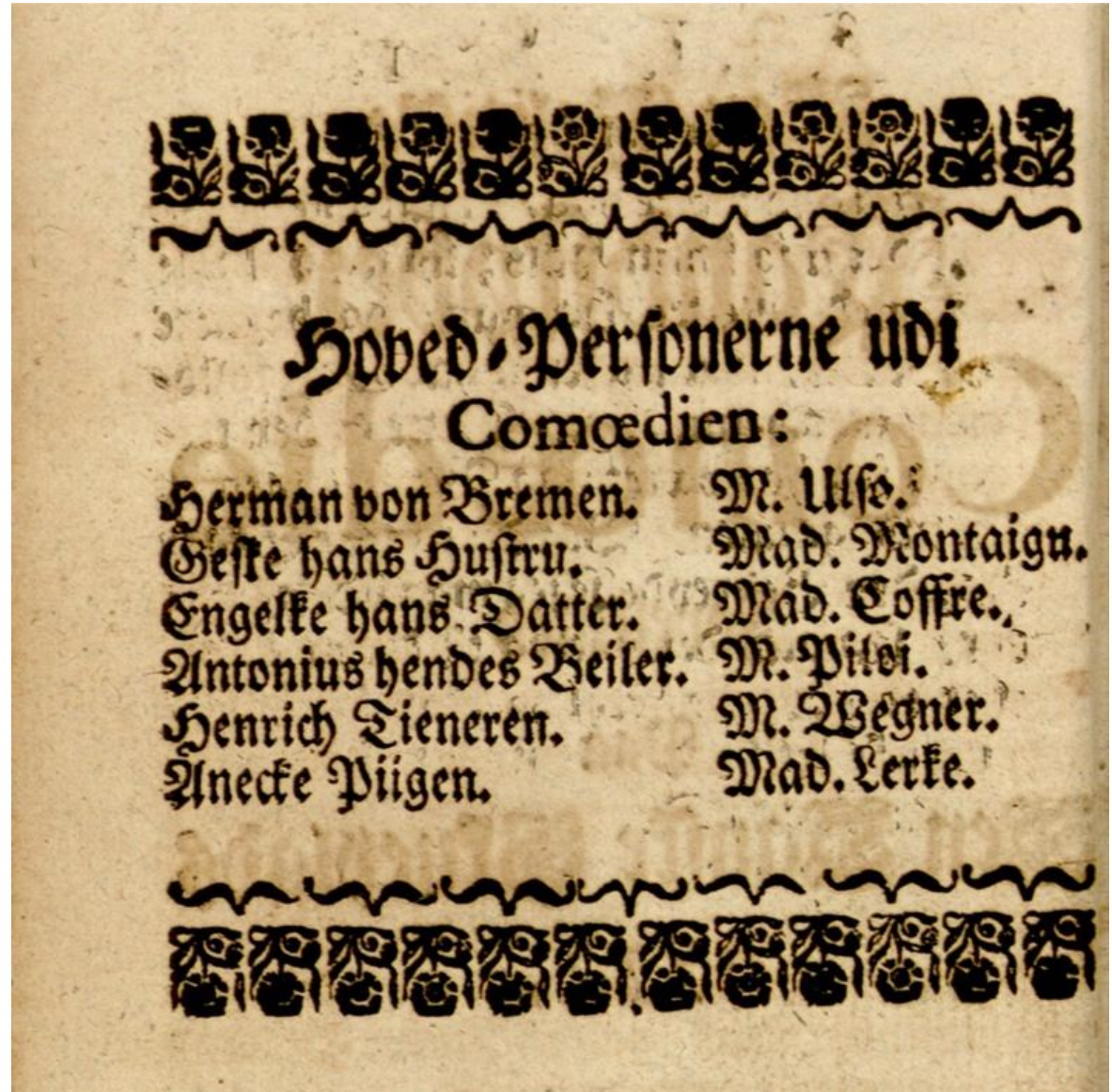
[Open in figure viewer](#)

[PowerPoint](#)

FIGURE 2



Concepts of character



Concepts of character

- Character
- Role
- Mask



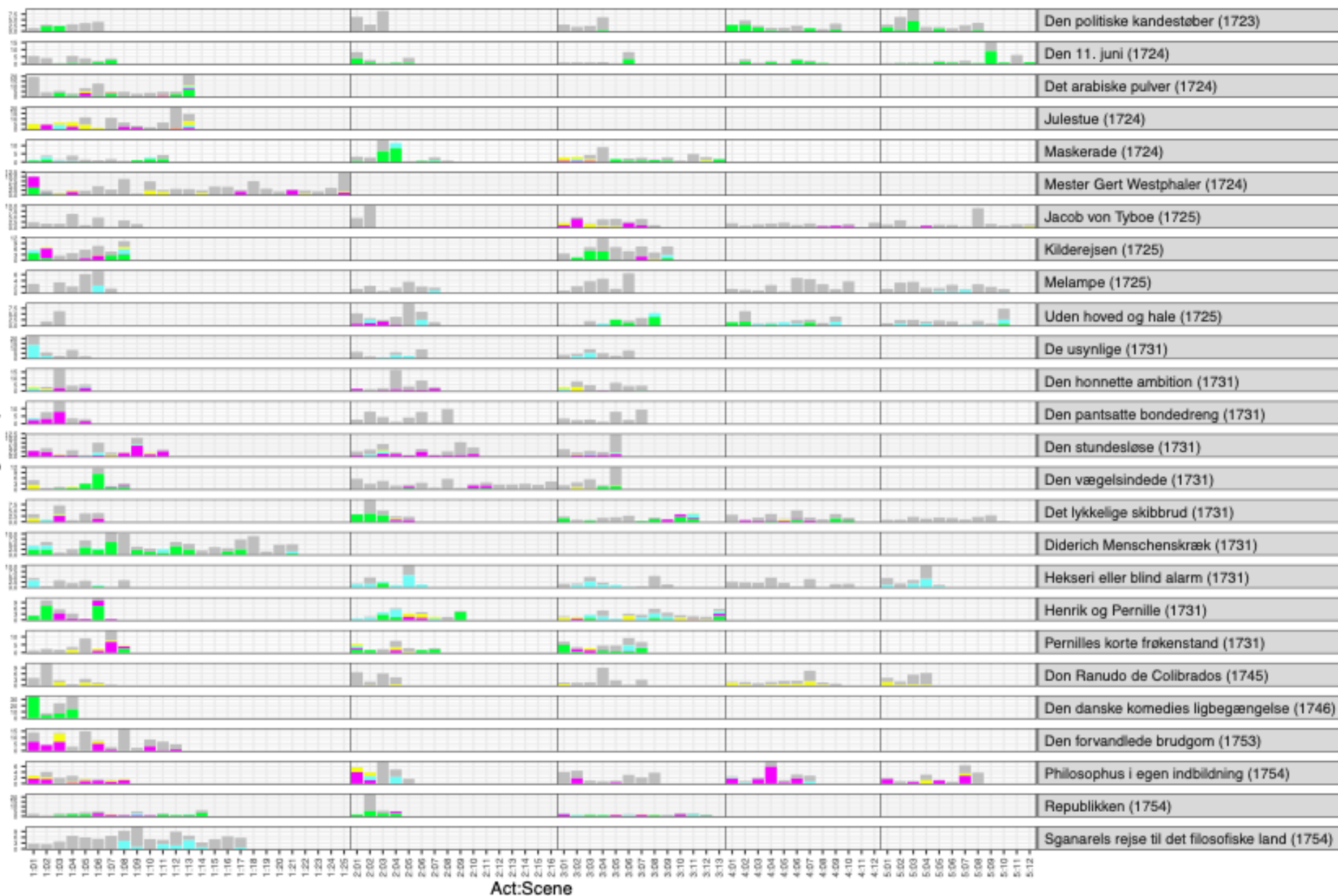
Verbal presence, Holberg's stock characters

1. pernille	3635
2. leander	2120
3. henrik	2068
4. jeronimus	1399
5. leonora	562

Male and female verbal presence

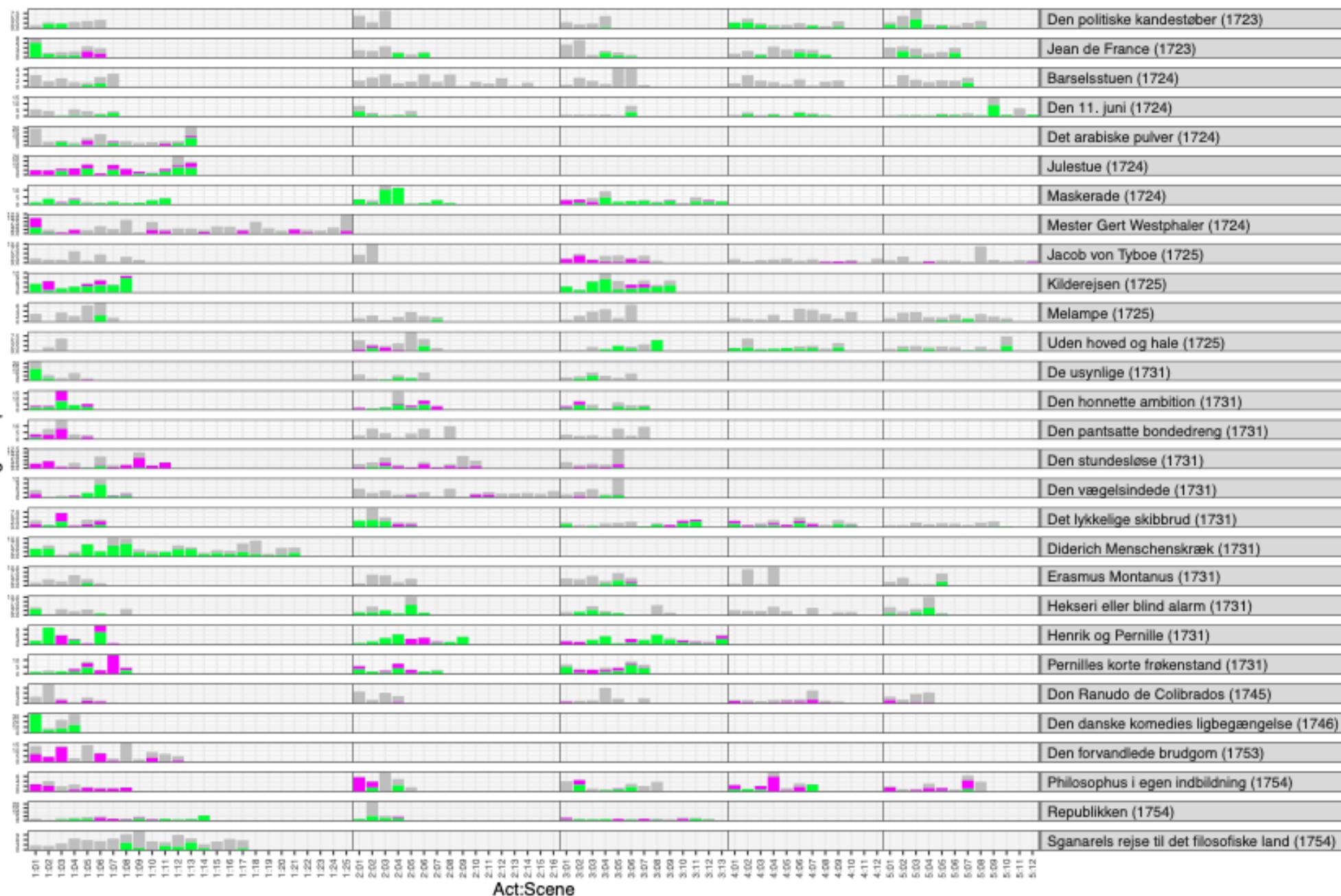
Speaker	Words	Lines	Plays
Pernille	28.088	3.634	17
Henrik	42.073	2.068	17

Percentage of spoken words



henrik pernille leander leonora, leonore other

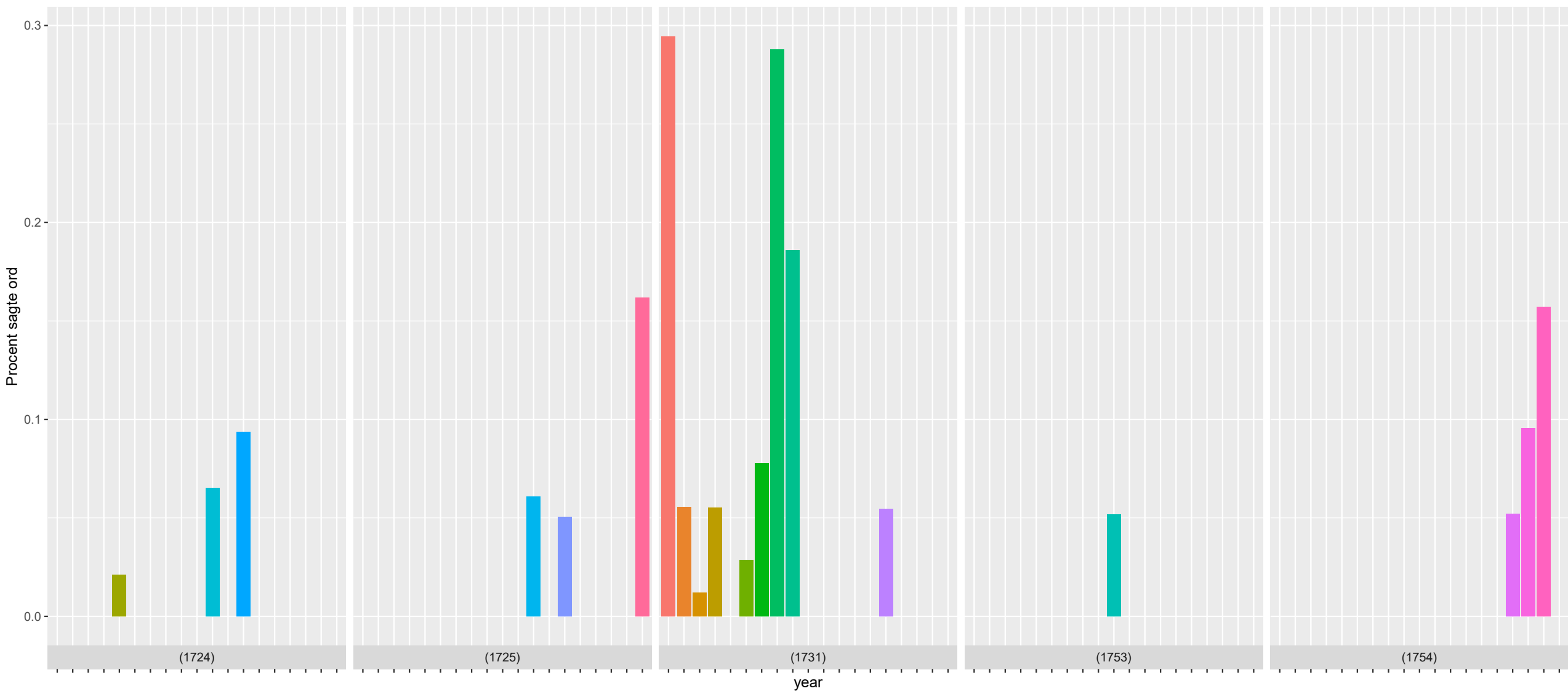
Percentage of spoken words



henrik, jeronimus, arv, leander pernille, magdelone, leonora, leonore other

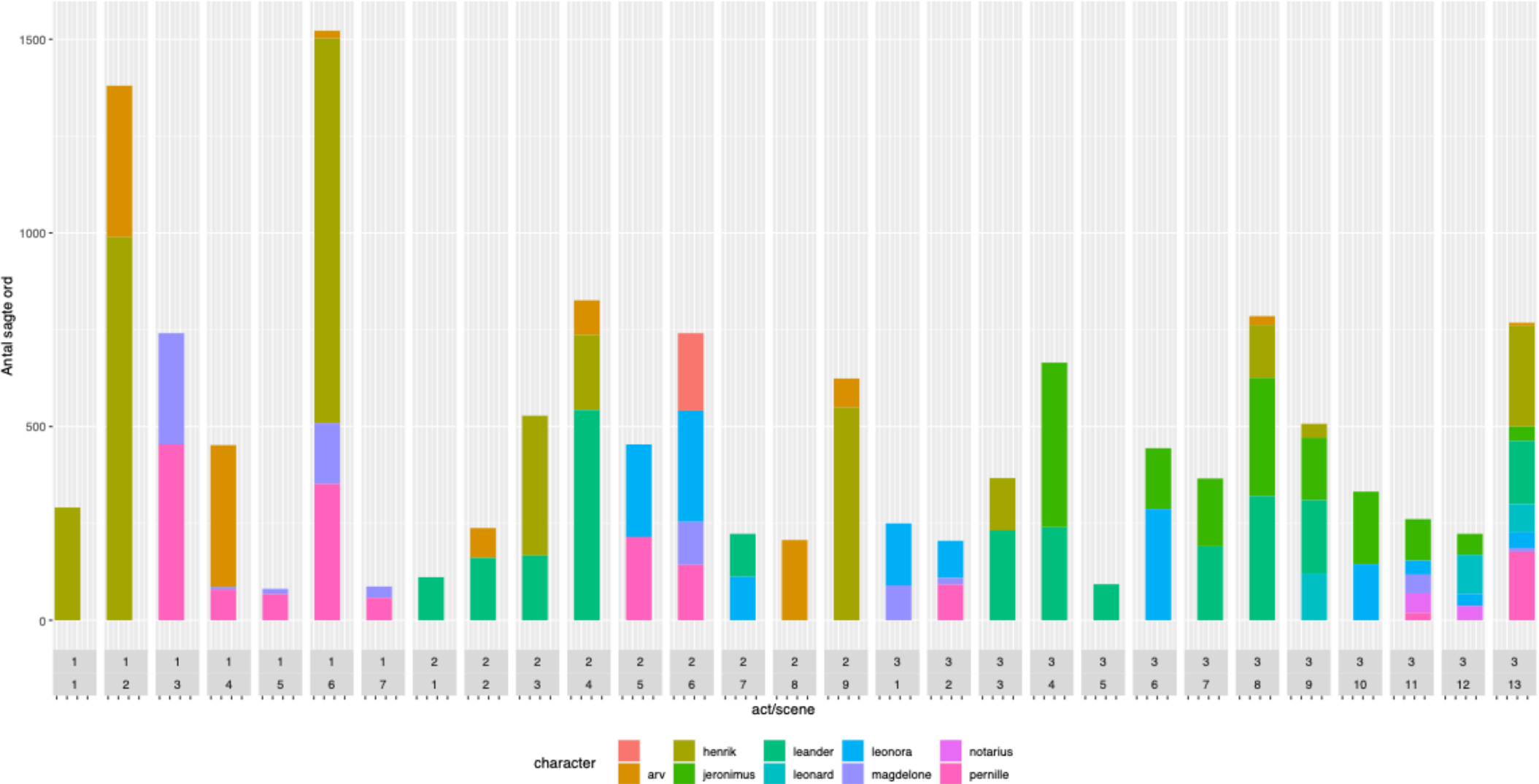
Procent talte ord over år og komedier

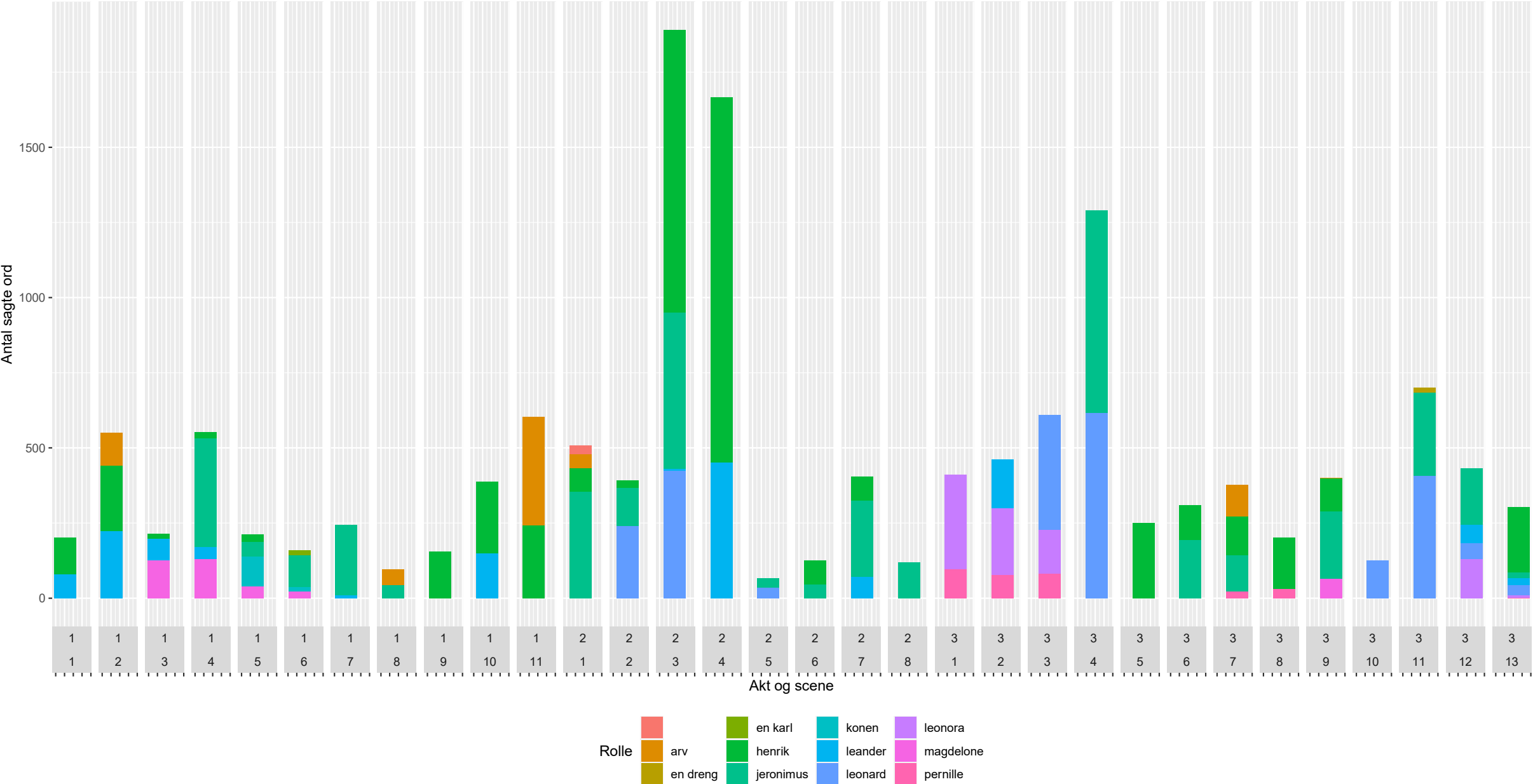
LEANDER

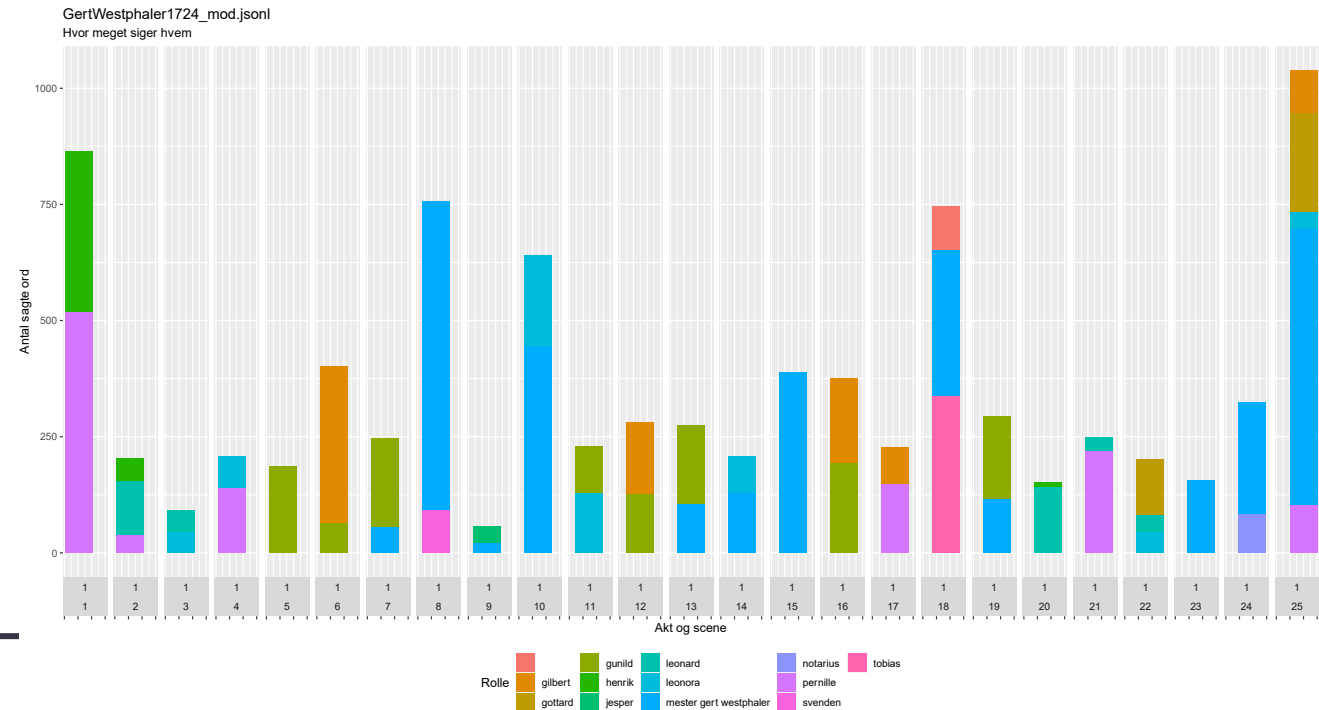
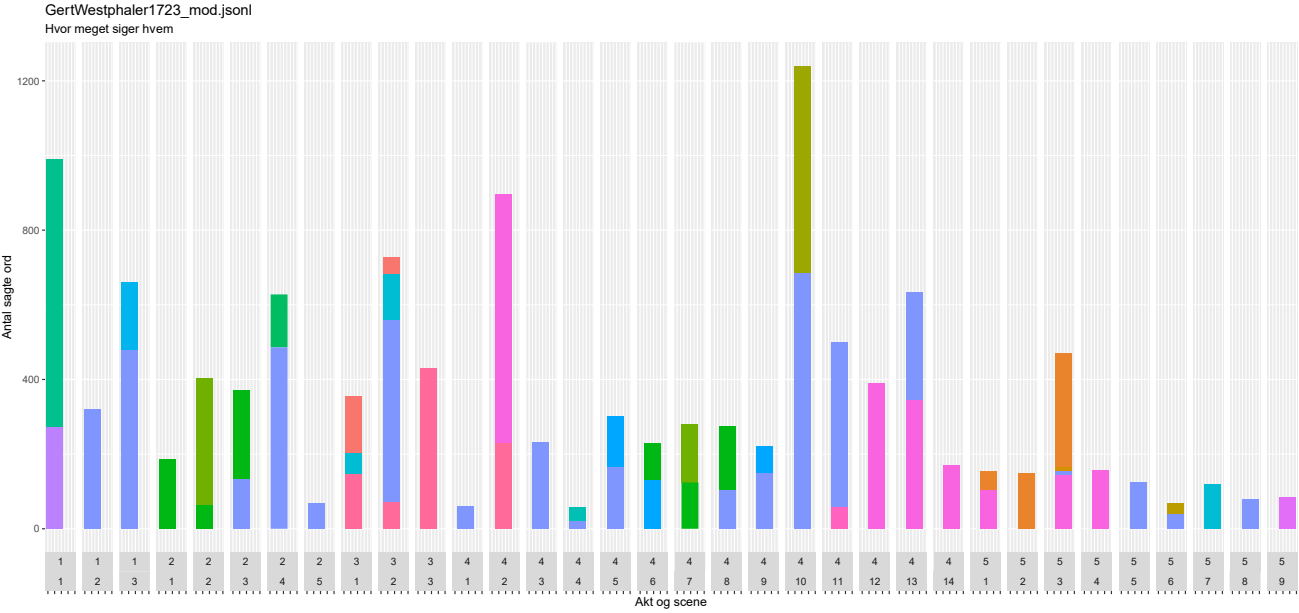


title

- | | | | | |
|--------------------------|---------------------------|--------------------|--------------------------------|--|
| De usynlige | Det arabiske pulver | Henrik og Pernille | Maskerade | Republikken |
| Den honnerte ambition | Det lykkelige skibbrud | Husspøgelse | Melampe | Sganarels rejse til det filosofiske land |
| Den pantsatte bondedreng | Diderich Menschengræk | Julestue | Pernilles korte frøkenstand | Uden hoved og hale |
| Den stundesløse | Hekseri eller blind alarm | Kilderejsen | Philosophus i egen indbildning | |







Key findings

No overall structural consistency or development in Holberg's works

Patterns of presence as generic signals: Stock characters seldom appear altogether in the same scenes.

Levels of presence: The spectator and the imagined presence of characters are crucial for connecting the dots

Different statistic analyses and visualisations are crucial for grasping the theatrical complexity

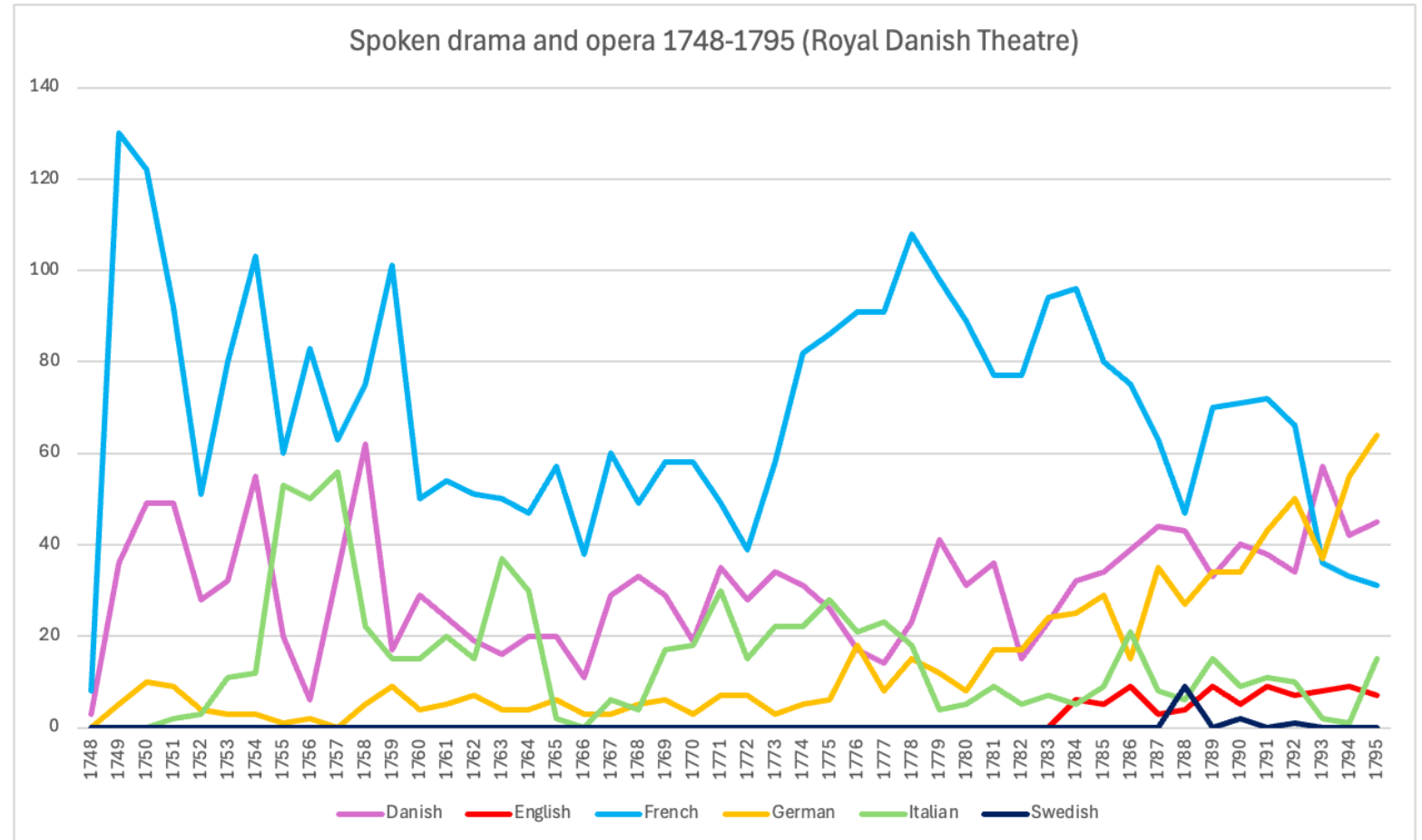
Future developments

- Denmark's Dramatic DNA:
ongoing digitisation of 18.000
Danish plays



Future developments

Artistic Exchanges and Transnational Stages



A photograph of two women sitting on a wooden bench in front of a dark red curtain. The woman on the left is wearing a light brown trench coat and has her hands clasped. The woman on the right is wearing a denim jacket over a red top and is gesturing with her right hand. The text is overlaid on the image in white.

Small Large Language Models for Digital Humanities Tasks

The Bechdel-Wallace-Test on the DraCor as a Model Case

Thomas Jäger, Universität Wien (thomas.ralf.jaeger@univie.ac.at)



Disclaimer

- This projects evaluates SLLMs
- On a large corpus
- With a prototypical task

Which happen to be DraCor and BWT.



What to expect

1. SLLM
 - Definition LLM and SLLM
 - Advantages SLLM
 - Model Description
2. Application
 - Requirement Engineering
 - Rating System
3. Bechdel-Wallace-Test
4. Results
5. Take Aways



Large Language Models?

- Can do lots of things using human like language skills
- Trained on very large Corpora
- Use lots of memory and processor time
- No distinction of the technology
 - Transformer
 - RNN
 - Diffusion
- No distinction between „Engine“ and „Product“
 - The pure LLM
 - The Finetuned LLM
 - The Frontend that directs to DallE?
- Not really applicable for Multi-modal Models or MoE

Small_(er) Large Language Models



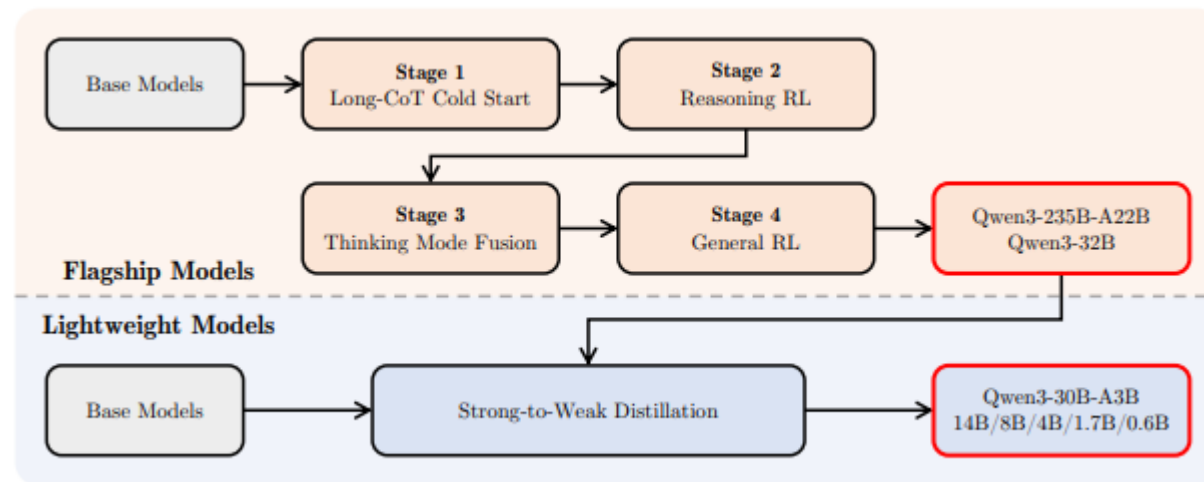
- Can do lot's of things using human like language skills
- Use less memory and processor time than larger LLM
- Distillations
- Less parameters, less precision
- Less performance
- Reduction in Size not linear to reduction in Quality
- Finetuned to emulate larger Models
- Take on implied information
- Smallest models reduce capabilities (not multimodal, not reasoning)

Actually: The only real Large Language Models in the conventional sense, that are on the market, are very, very small Models!



Teacher – Student

(works best with related models)



Qwen Team: Qwen3 technical report
<https://arxiv.org/pdf/2505.09388>



Model Selection by hardest task

- All interfaces are the same.
- Only one licence.
- If the hardest task works, all the other will.
- Easy choice process.
- **VERY** agile work process – *just start and find out ...*



- Requirements Engineering:
 - What is needed?
 - What is the expected outcome?
 - What is the expected quality?
 - For what purpose?
 - When?
- Quality insurance
 - Benchmarks
 - Test cases
 - Test routines

SLLM are better science!



Chimney Sweeper principle

It's more economic to use tiny models for narrow tasks

- Better adaption for tasks.
- More flexible workflows.
- Independence from large Business solutions.
- Less hardware
- Less costs
- Less Environmental damage

Why Small Models?

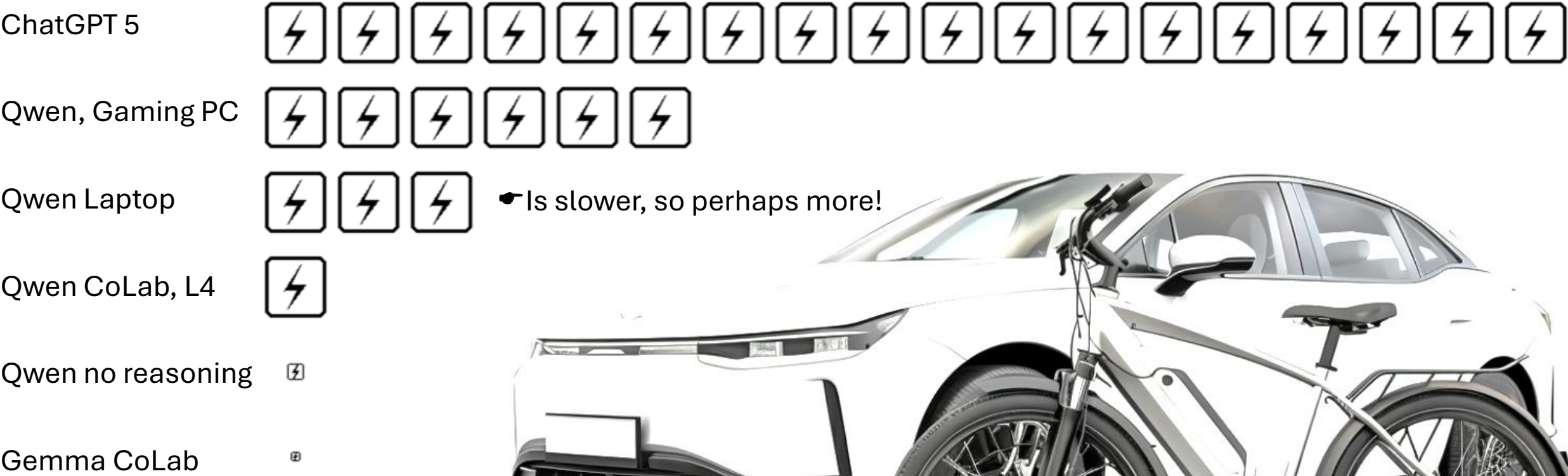
- Lower Ecological Footprint
- Lower operational cost
- Privacy-preserving local processing
- Independence from political change
- Inspection, Explainability
- Domain Adaptation.
- Long-term reproducibility.
- Engineered pipeline and explicit rationales make compact models competitive.

Compact models are better suited to auditable, corpus-scale scholarly workflow



Gemma3-4b-it	Qwen3-8B
Multilingual 100+ languages	Multilingual 100+ languages
Multimodal LLM, instruction fine-tuned	Mixture of Experts with reasoning abilities
Google	Alibaba
c.a. 8GB	c.a. 18+GB
GPU, CPU	GPU, CPU

Energy ressources





Bias

If half of the population is female,
a repeated random pick of two
should yield:
 $\frac{1}{2}$ man + woman
 $\frac{1}{4}$ man + man
 $\frac{1}{4}$ woman + man

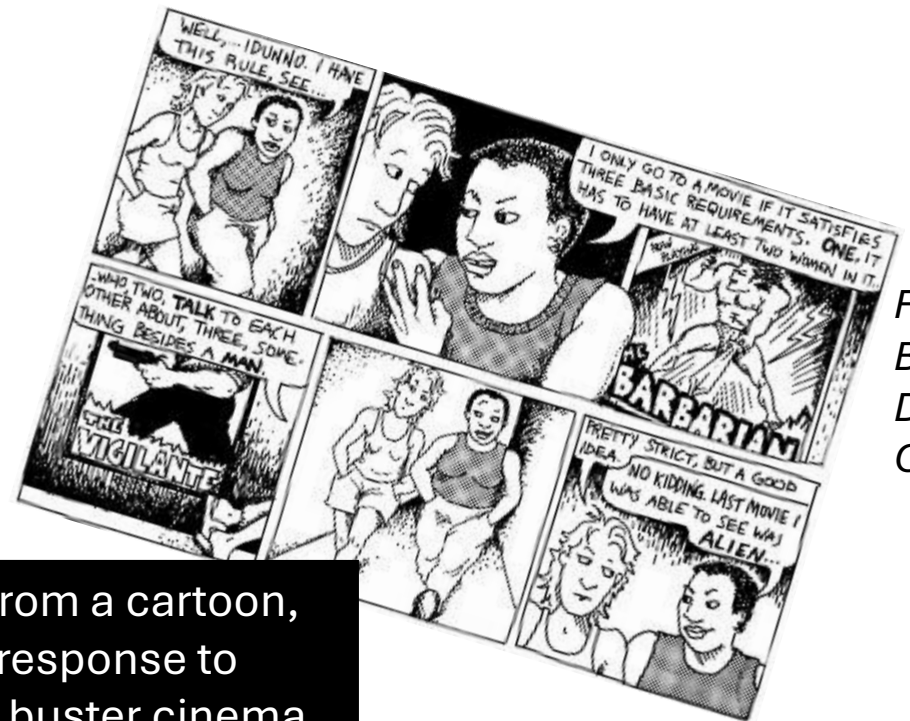
Unexpected Outcomes need explanations.



From A. Bechdel: *Spent*. 2025

Bechdel-Wallace-Test

1. At least two (named) female roles
2. Who talk with each other
3. About something else than a man

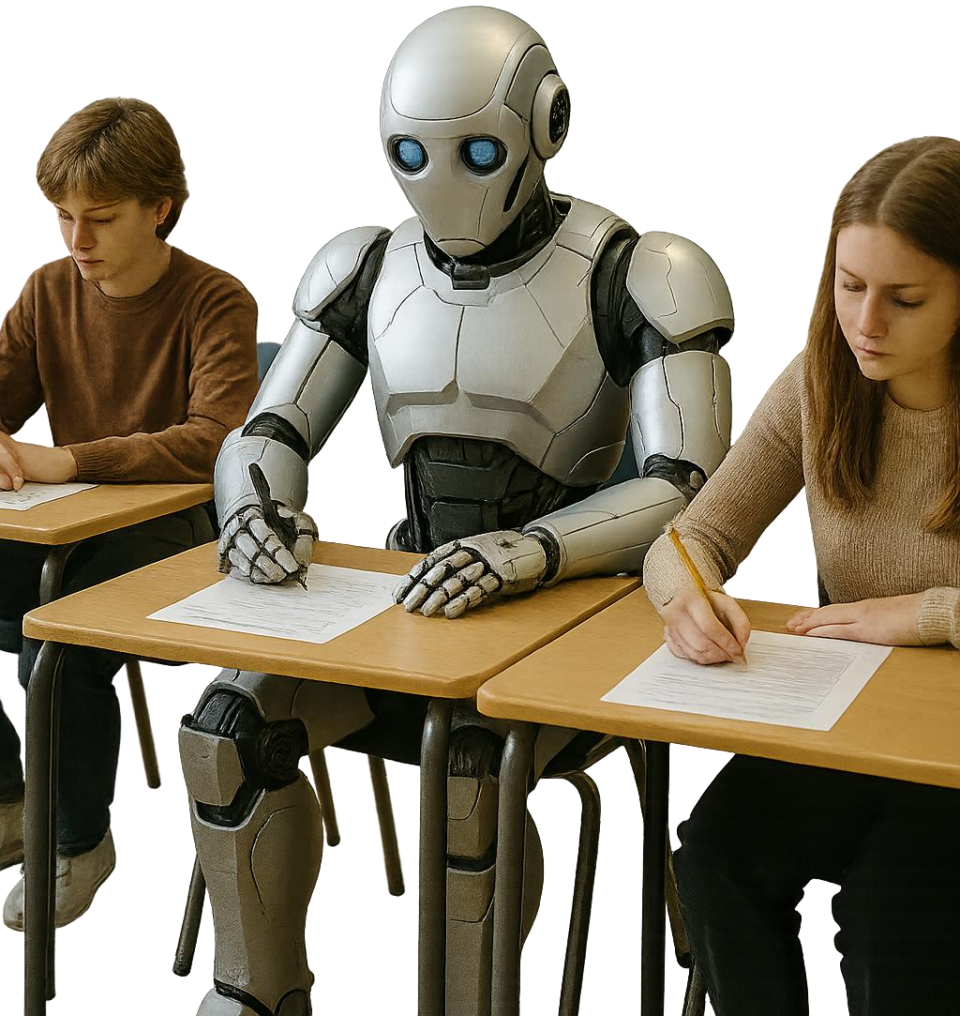


From A.
Bechdel:
*Dykes to Watch
Out For*. 1986

Originating from a cartoon,
as a critical response to
1980s block buster cinema

How would YOU apply the BWT?

Gemma3, 3 minutes per variant on standard Laptop



Edge Cases

Realized as half to one-page dialogues between two women
Variants to neutralize external factors:

- Different languages
- Different moods
- Different styles

Bot (Claude, Gemini, ChatGPT)	Human (Humanist Students in a Python Seminar)
What is the Bechdel-Wallace Test? Give a short introduction.	Introduction to BWT in a twenty-minute presentation.
Here is a small dialogue. Would it pass the BWT?	Handout on paper, silent labelling (different versions).
[different Chat] As a {critic, scientist, gender researcher} summarize this dialogue in a few sentences	Classroom discussion of labelled texts



Edge Case metaphorical speech in the real DraCor

Упустила **голубонька**, *Female!*
Та вже й не піймаю!
Упустила, не впустила, –
Геть сама одбила:
А тепер лежить **він** в полі *Male!*
Та й стуливши крила!

I let my dove slip away,
And now I'll never catch him!
Whether I lost him or not –
I drove him away myself:
And now he lies out in the field
With his wings folded shut!

u00000043



Literal reading:

1. The dialogue has a certain man/men as a topic, or deals with men in general.
2. The dialogue has other topics than a certain man/men or men in general.

} “or”

Foreground, intention reading:

3. The main topic is a certain man/men or men in general.
4. The main topic is not a certain man/men or men in general.

} “XOR”

Additional information:

5. A main or major topic is male–female relations, marriage, or partnership.
6. The dialogue rarely mentions a man directly, yet covertly (symbolically or by indirection) a man/men are an important topic.

Implementation



Rating

Fully matches	Partly matches	Doesn't completely match	Doesn't match at all
2	1	-1	-2

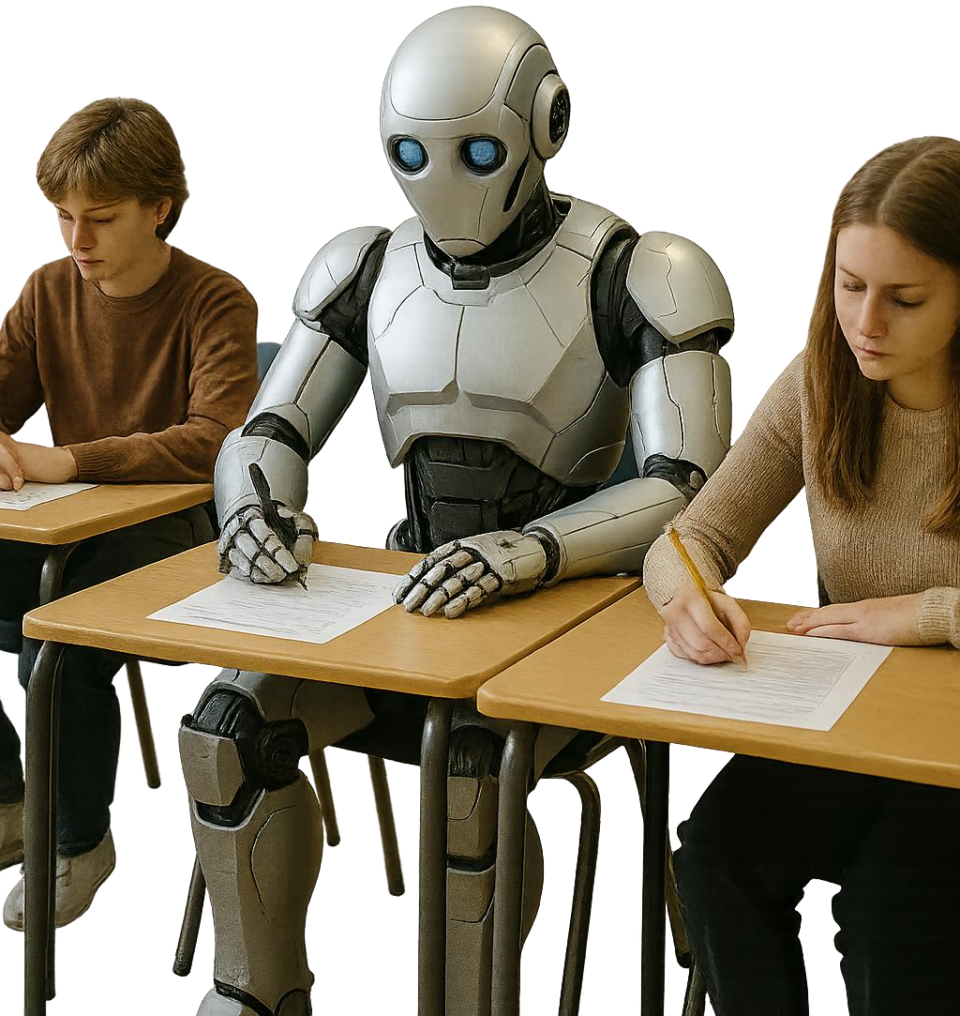
Example “dove”-scene from *u0000043*

Has man topic	2
Has other topic	-1
Man main topic	2
Other main topic	-2
Relationship	1
Metaphorical speech	2

“Smallest units of plays” (≈ scenes)

1. Two women scenes
2. All women scenes (with more than two roles)
3. Mixed scenes (with at least two women)

Do you (still) understand BWT like a human?



Edge and Normal Cases

Realized as half to one-page dialogues between two women

Variants to neutralize external factors:

- All languages in the corpus in same number
- Different moods
- Different styles

Expectations for labels are predefined for each Case

Check for correct implementations:

Gemma3, 3 minutes per variant on standard Laptop

Qwen3, 1 minute per variant on L4, CoLab

Alignment with Expectation

Each variant of a dialogue must yield expected values (within acceptance variance)

Thinking protocols



<think> Okay, let's tackle this annotation task. First, I need to understand the user's requirements. They want me to extract the addressees of each speaker in a dialogue. The characters present in the scene are sica, Segundo, Primero, Espino, Espiga, Vid. Wait, but in the dialogue provided, the characters mentioned are La Vid, La Espiga, Música, Ángel Primero, Ángel Segundo, El Espino.

Careful with temperature adjustments in Reasoning models!

But the first line is a monologue?

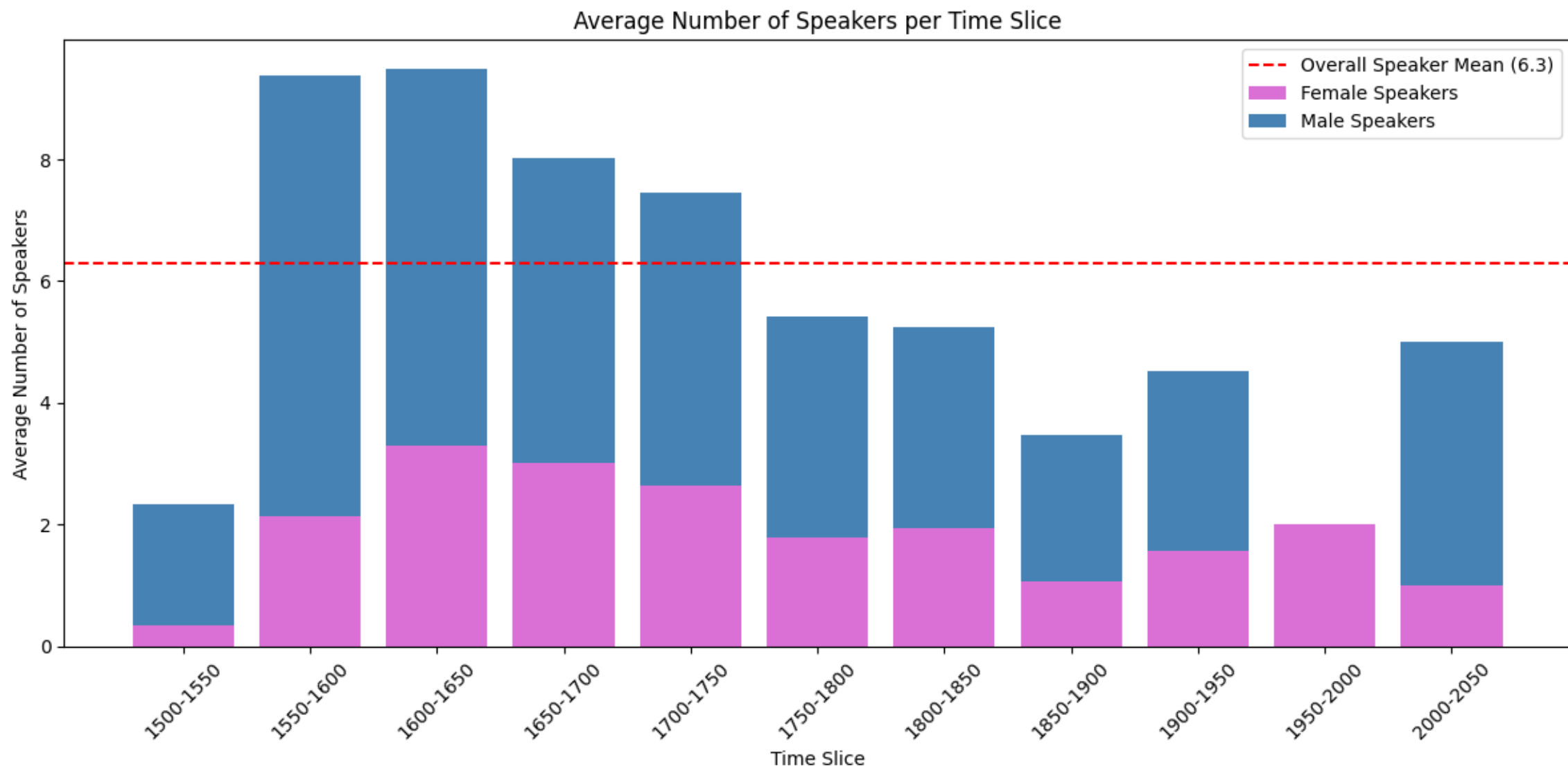
Or is she addressing the audience? But the user's instruction says to consider only the listed characters. So if the speaker is talking to someone else, that's the recipient. If not, then "Unknown". But in the first line, since the next speaker is La

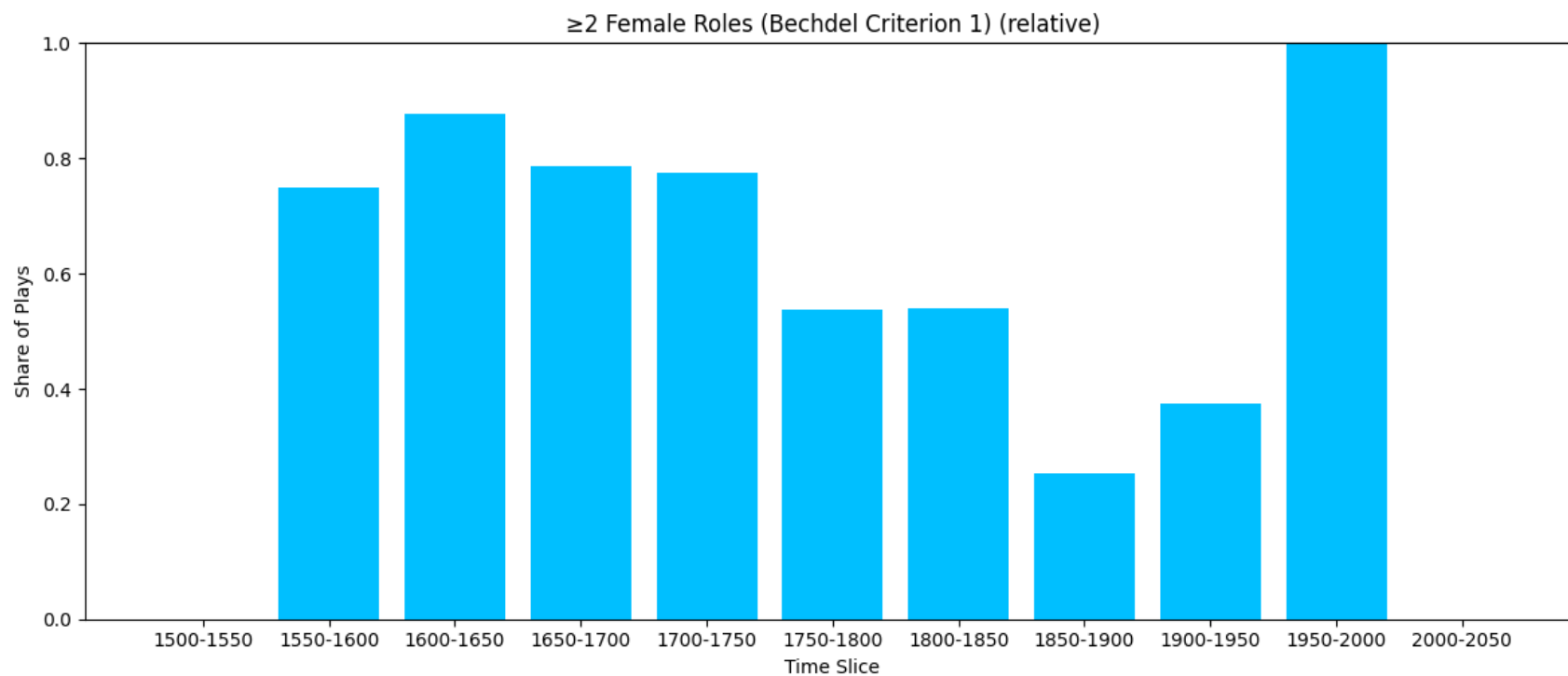
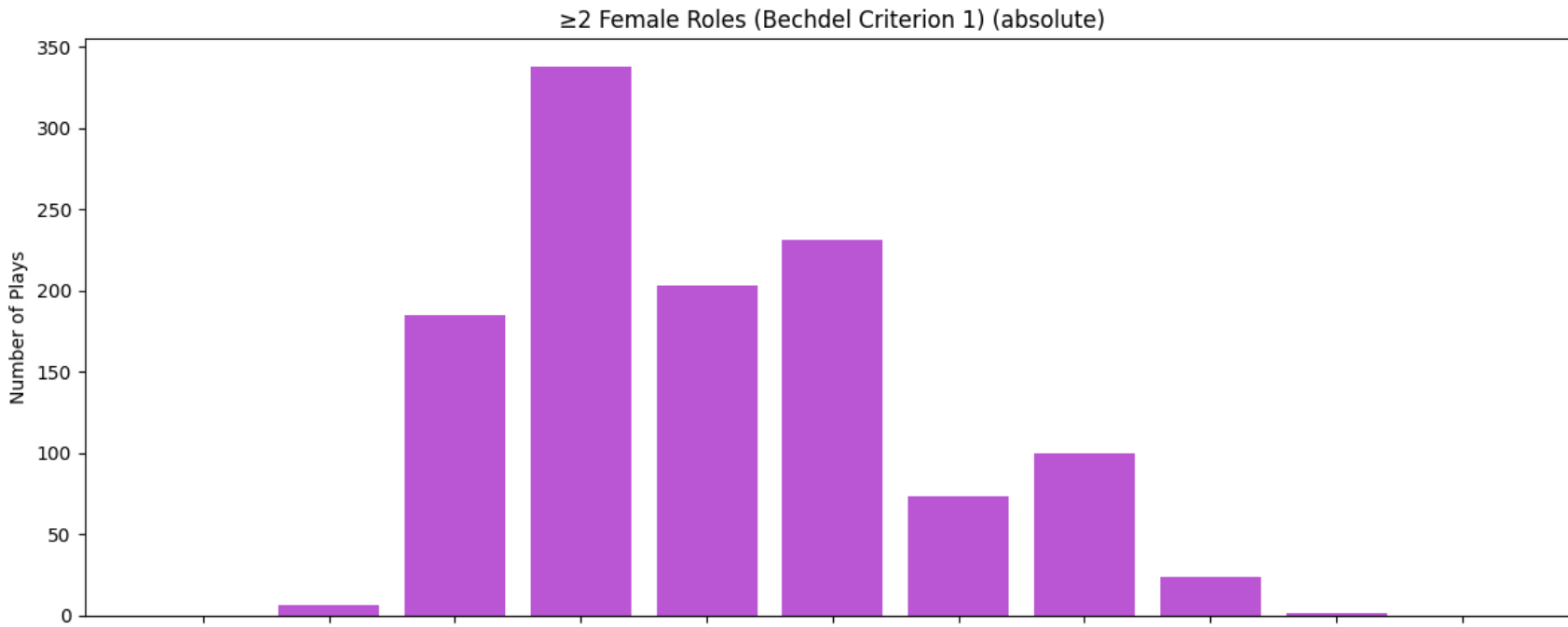
Espiga, maybe La Vid is addressing La Espiga. But the first line is a monologue? Or is

Putting it into Motion

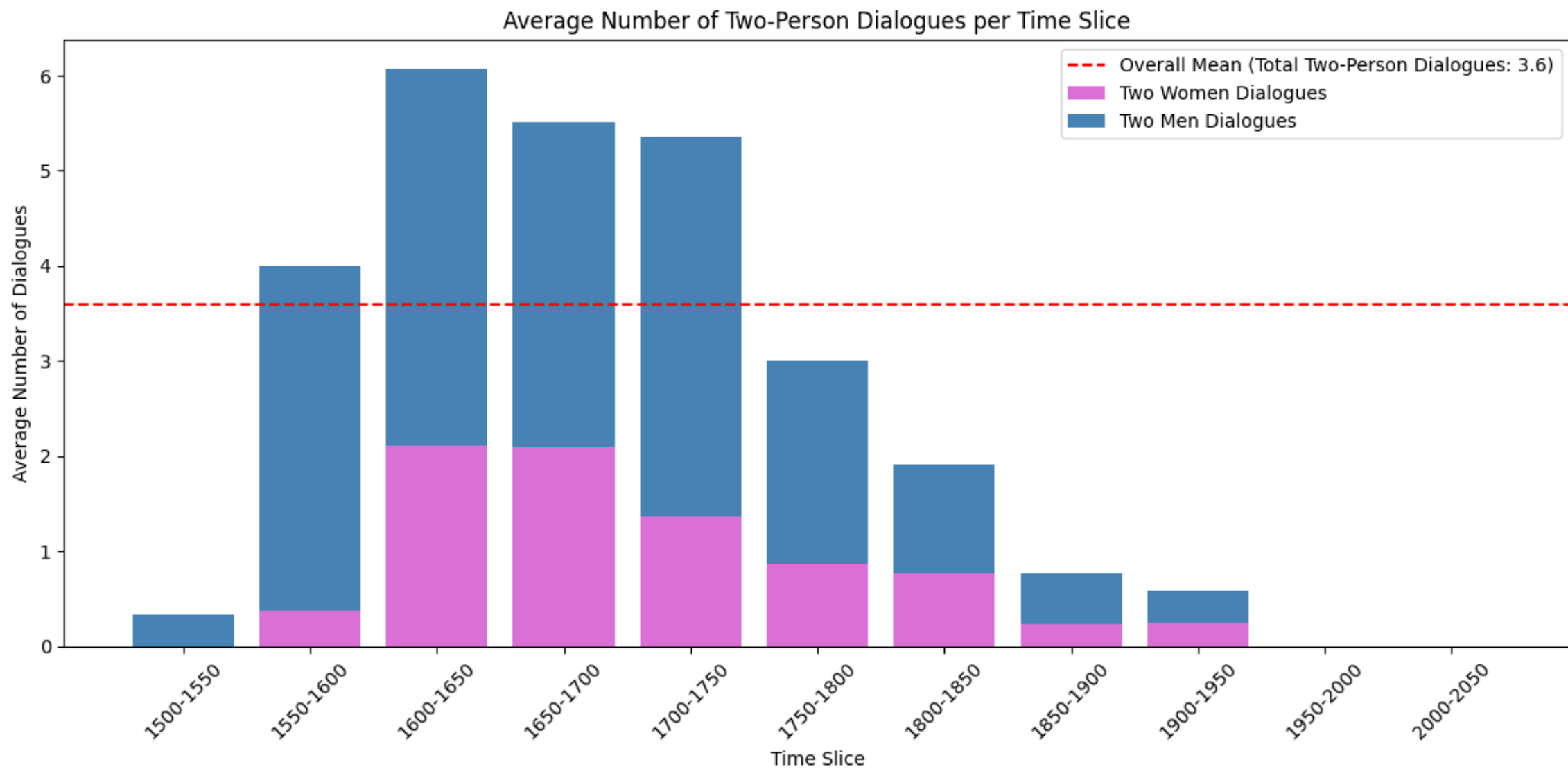


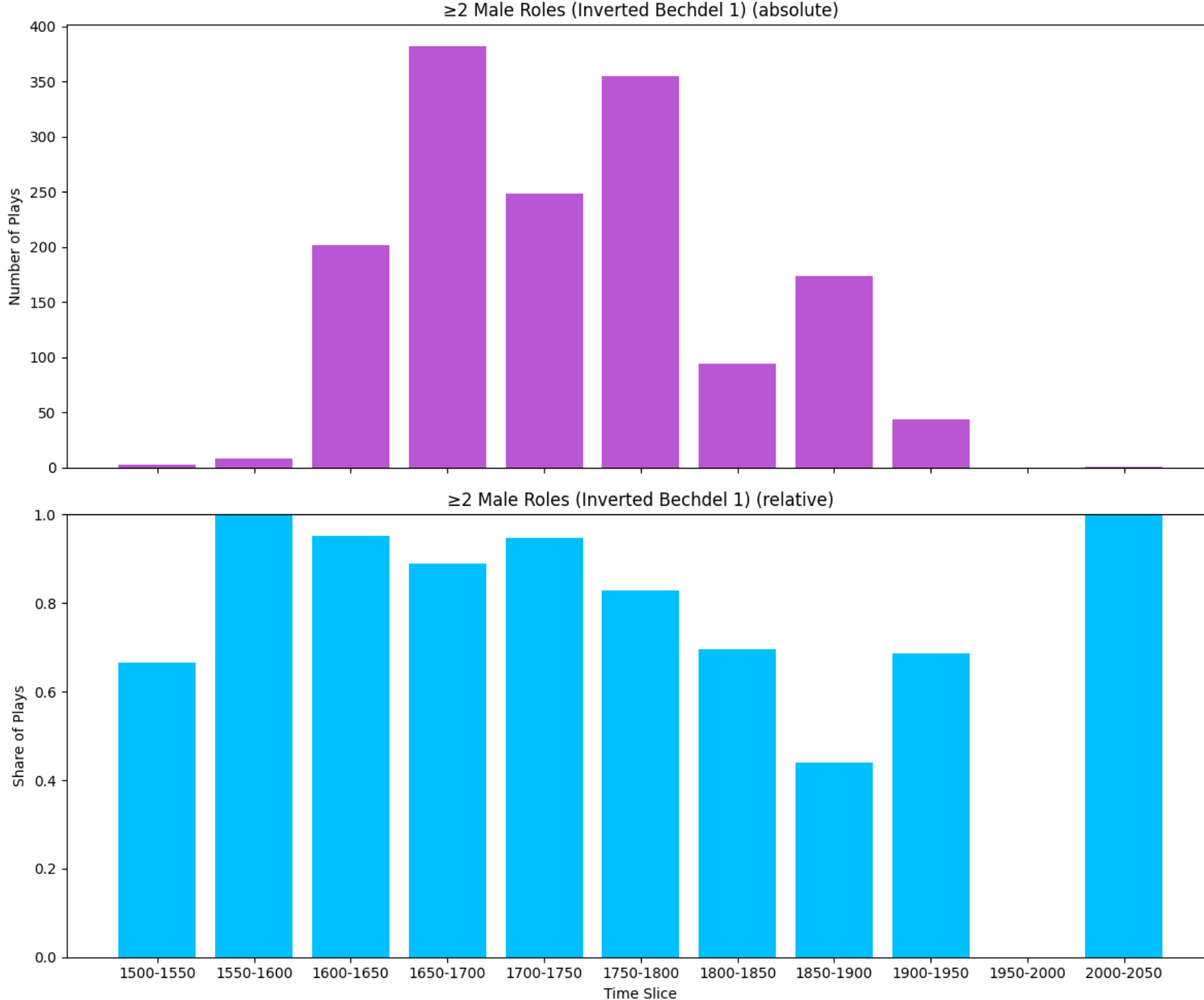
Selected Results:
The French Case





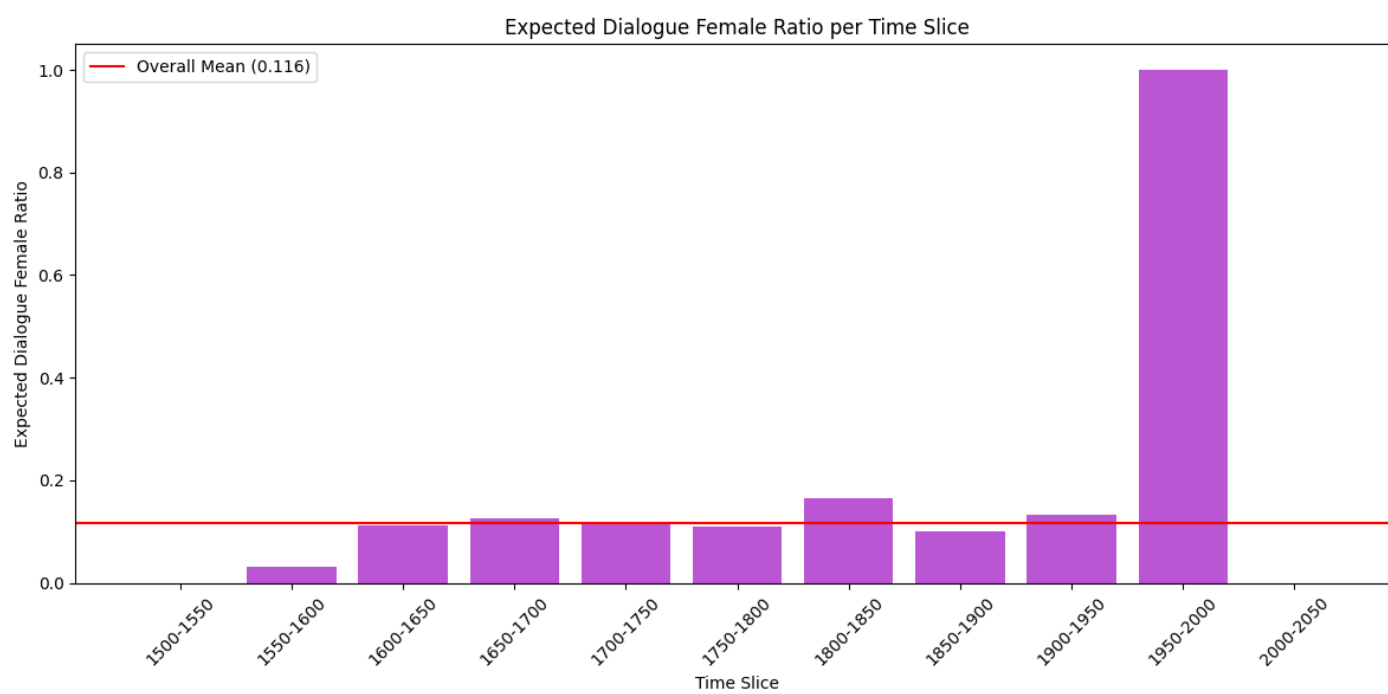
The first BWT Criterion:
At least 2 named female roles
is passed by a majority of plays, with a significant decline after 1750.





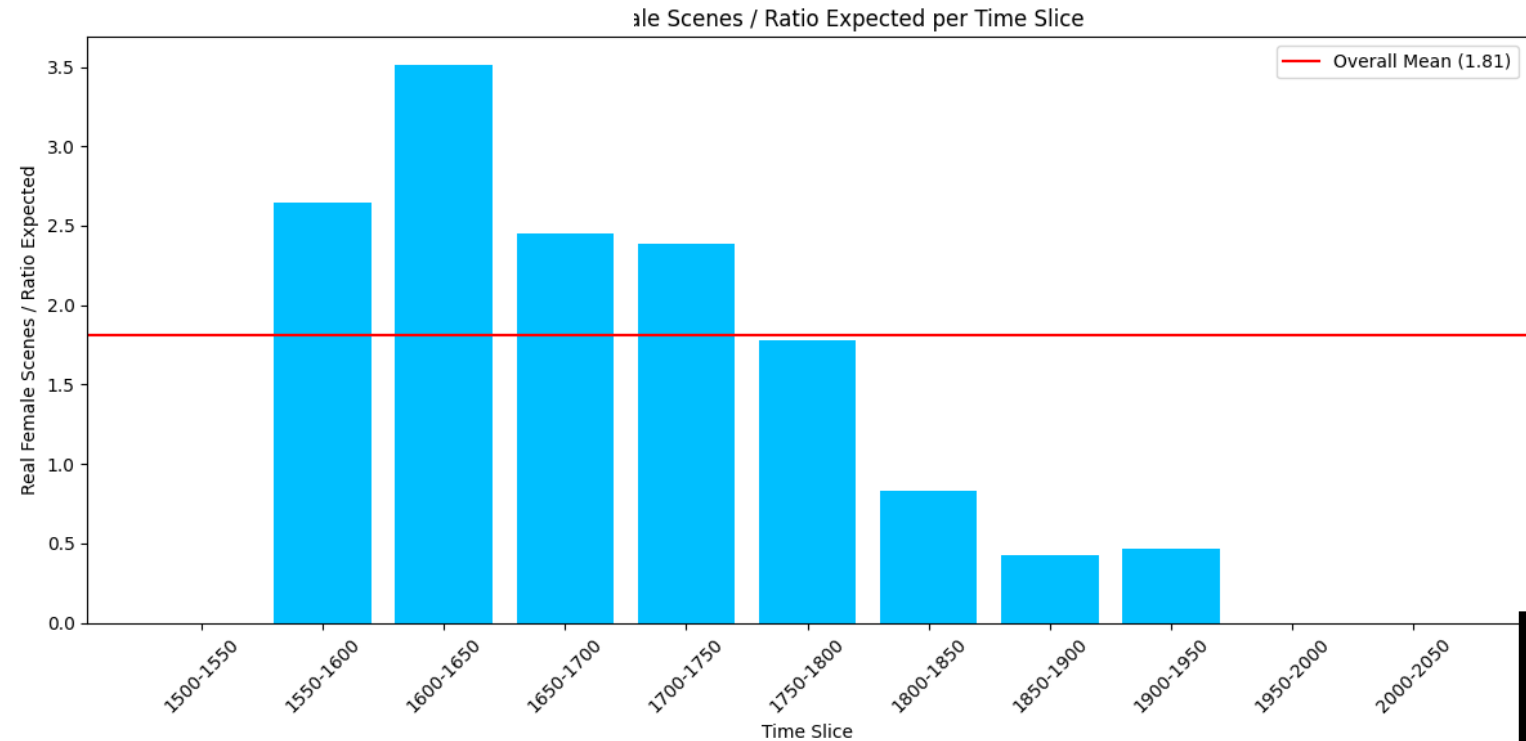
The first inverted BWT
Criterion:
*At least 2 named male
roles*

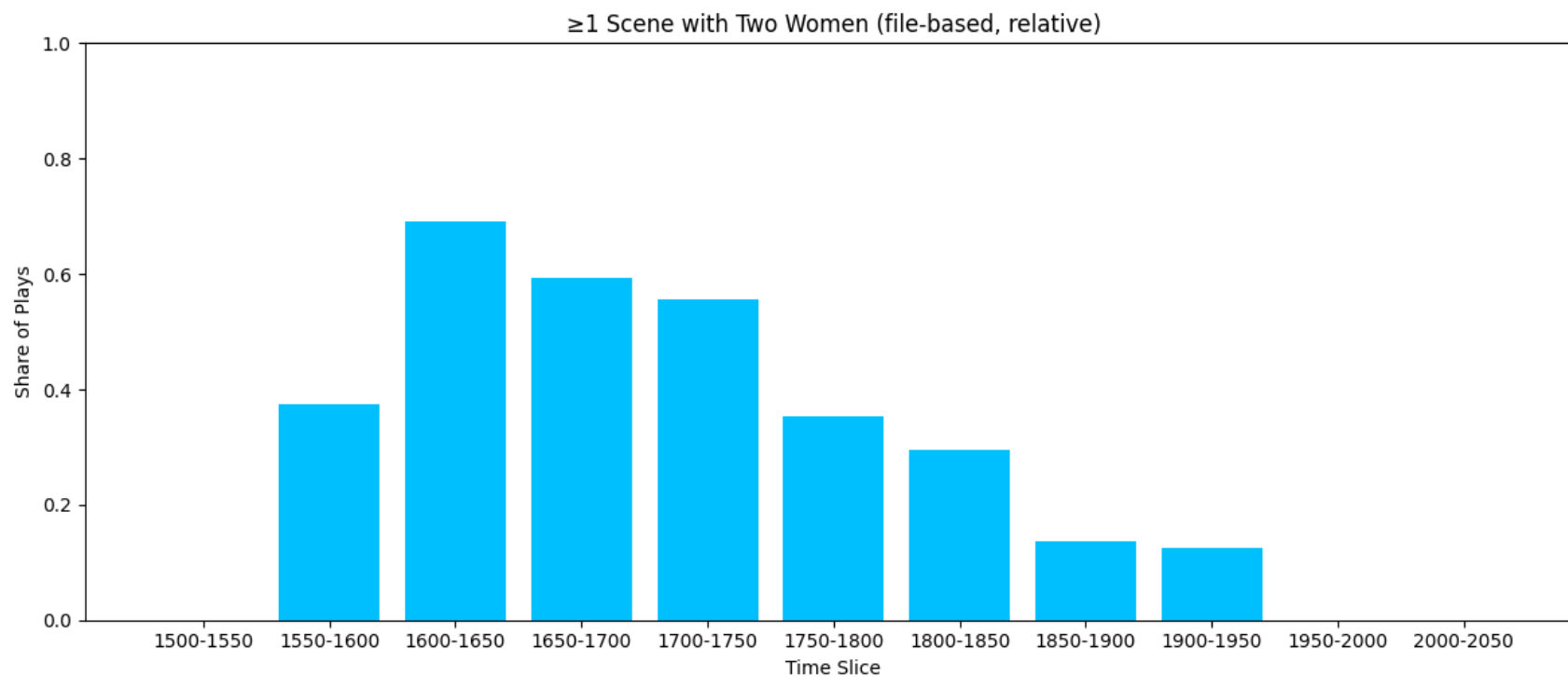
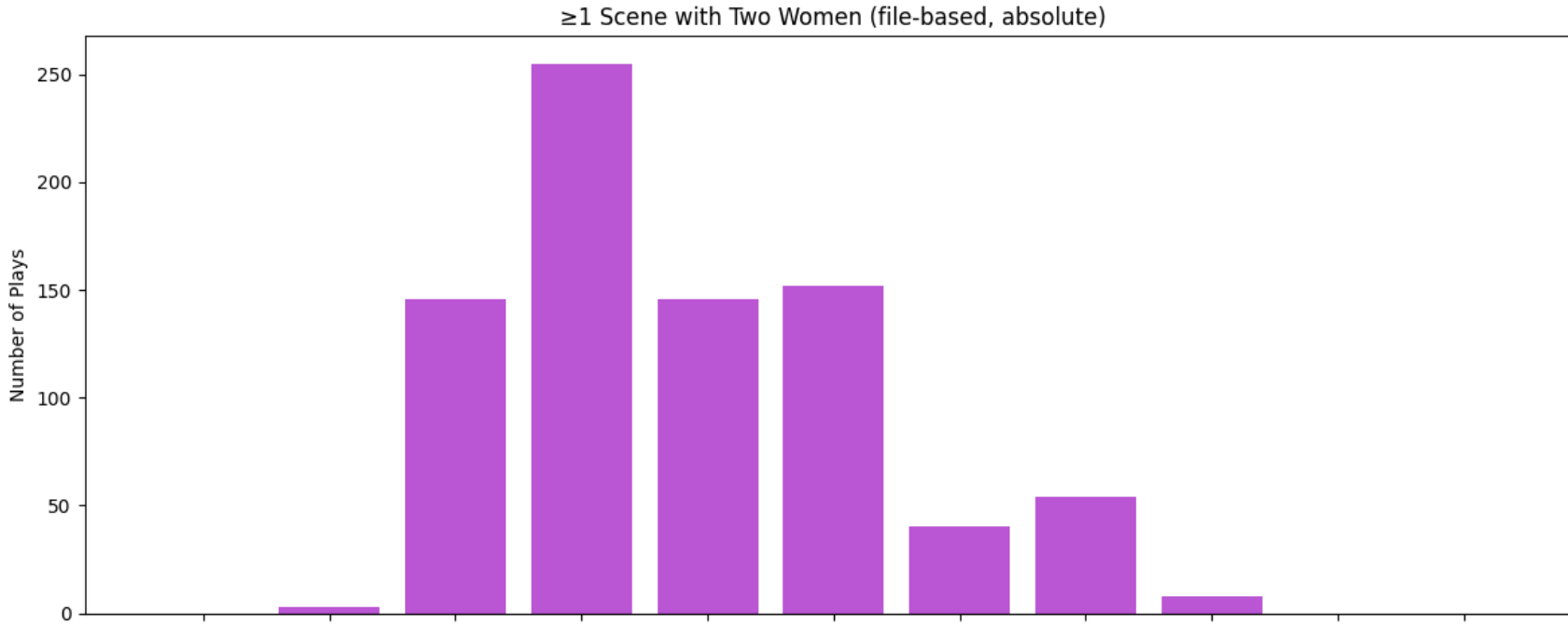
is passed by a majority of
plays, with a significant
decline after 1750.



Based on the cast list and the number of two-person scenes – the number of plays with one female-female scene should be low

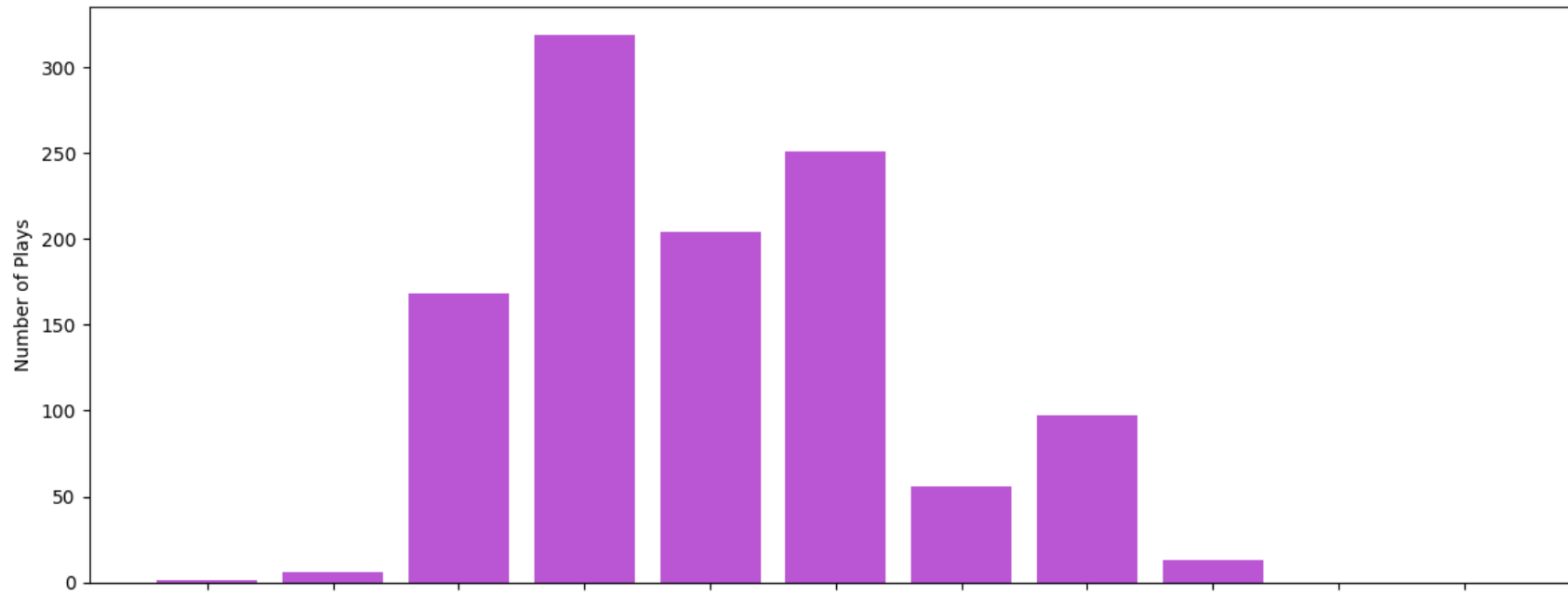
There is a positive bias towards scenes of two women talking among themselves



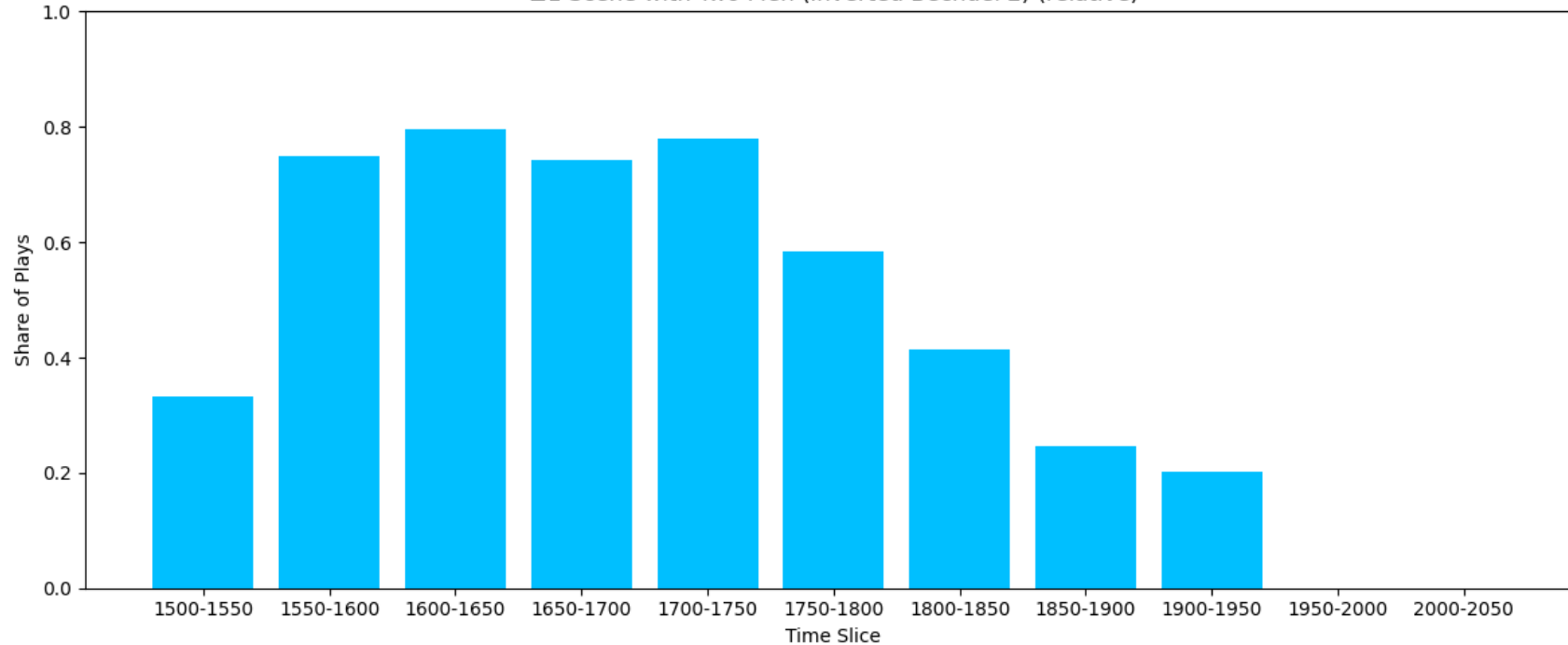


The second BWT Criterion:
*Two women talking with
each other*
is passed by about half of
plays since 1600, with
decline after 1650.

≥1 Scene with Two Men (Inverted Bechdel 2) (absolute)

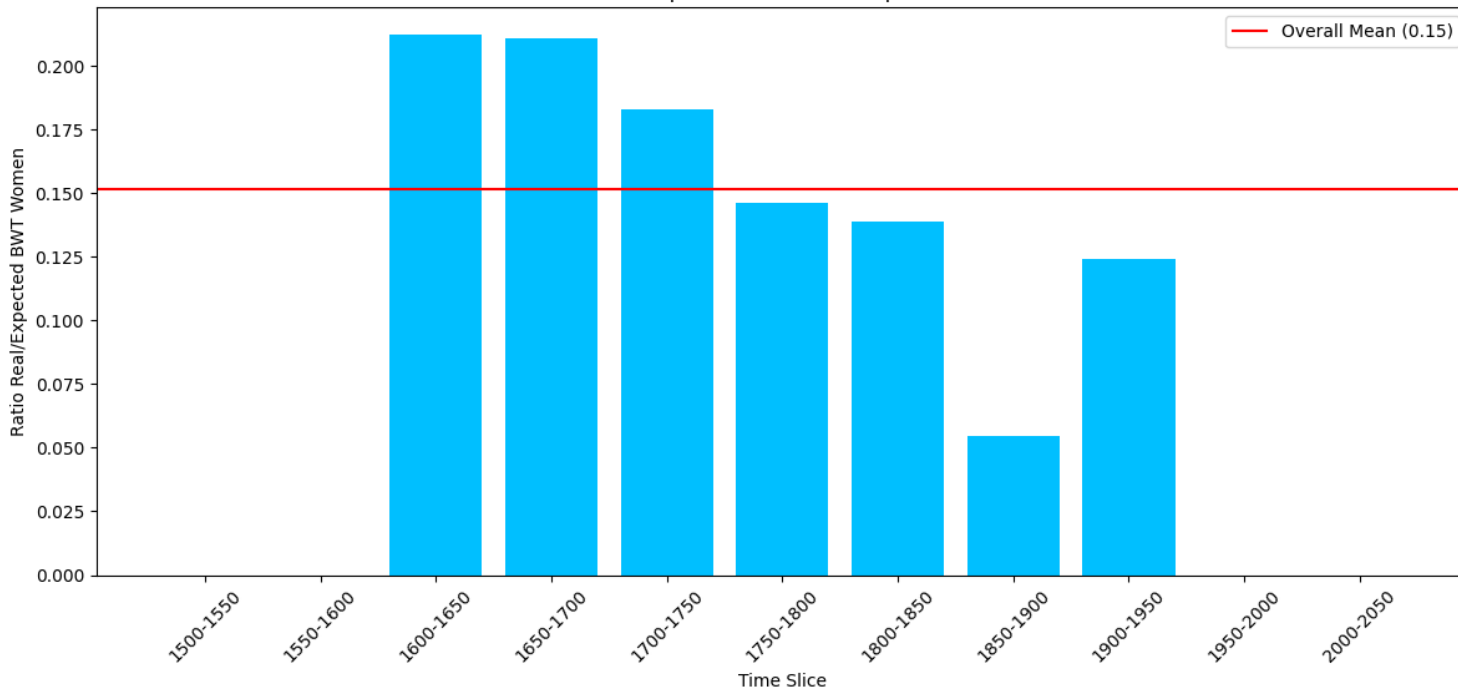


≥1 Scene with Two Men (Inverted Bechdel 2) (relative)

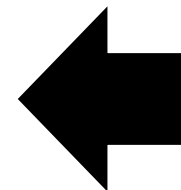


The second inverted BWT
Criterion:
*Two men talking with each
other*
is passed by two thirds of
plays since 1600, with
decline after 1750.

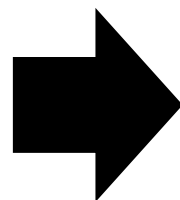
Ratio Real/Expected BWT Women per Time Slice



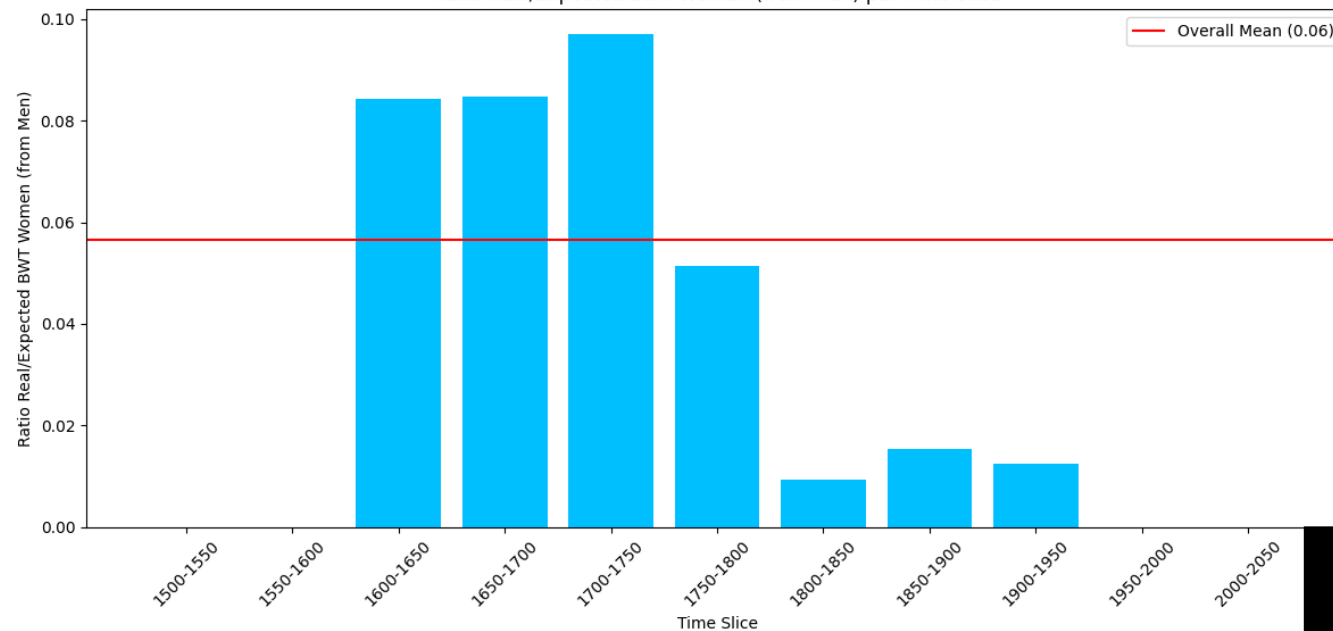
Given the ratio of the topics in same gender scenes, how many of the female-female scenes are passing the BWT?

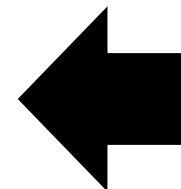
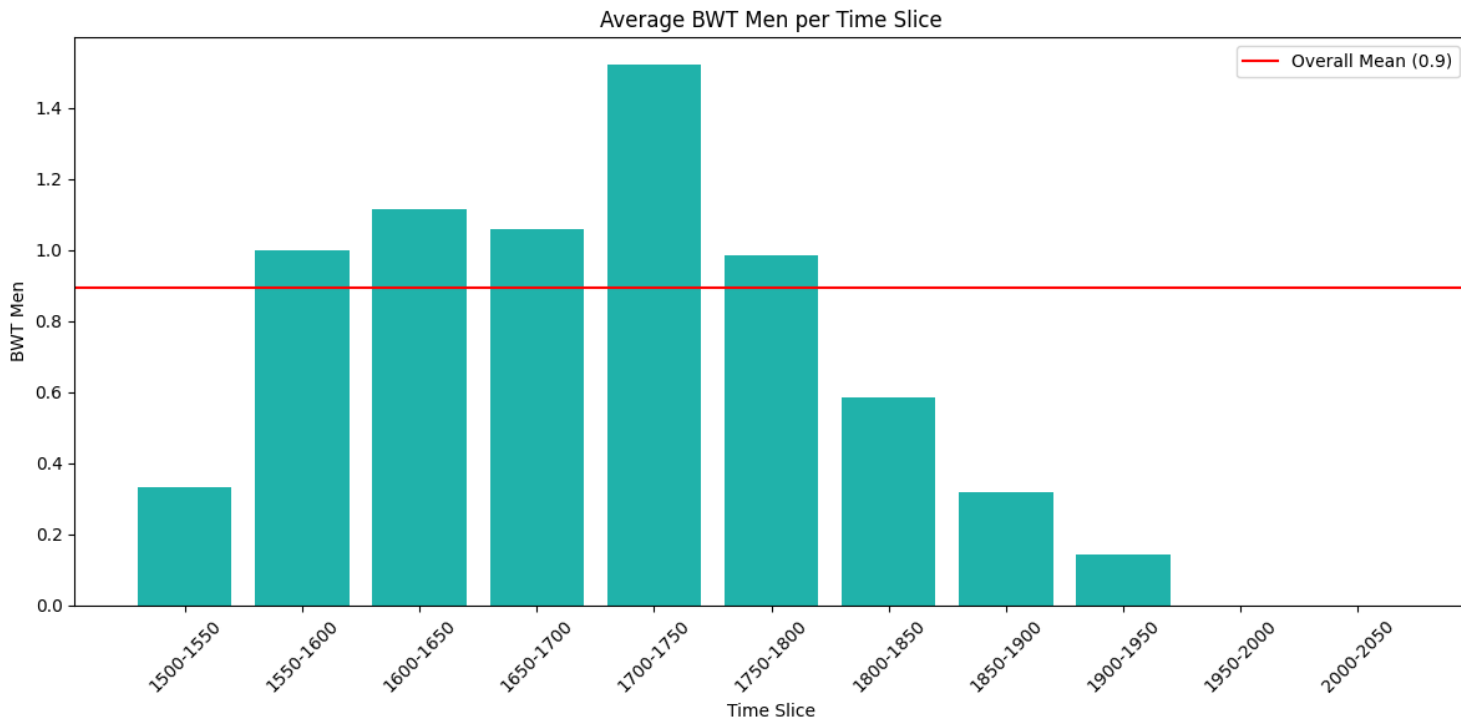


Given the ratio of the topics in male-male scenes, how many of the female-female scenes are passing the BWT?

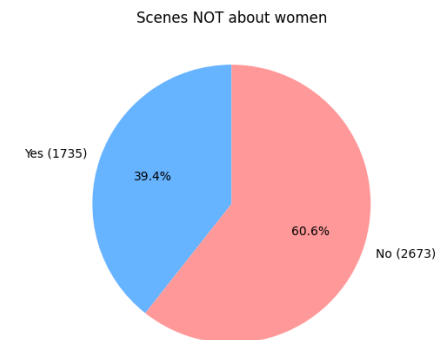


Ratio Real/Expected BWT Women (from Men) per Time Slice

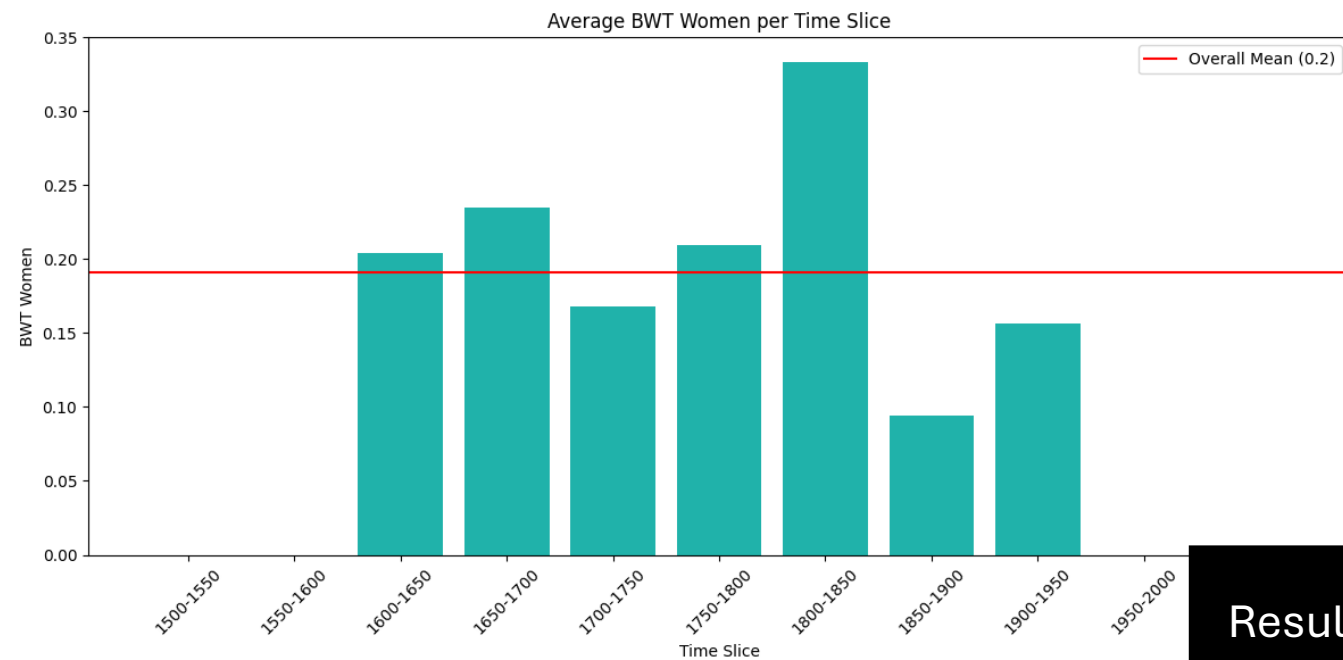
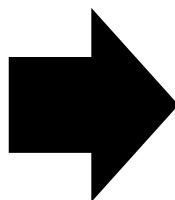




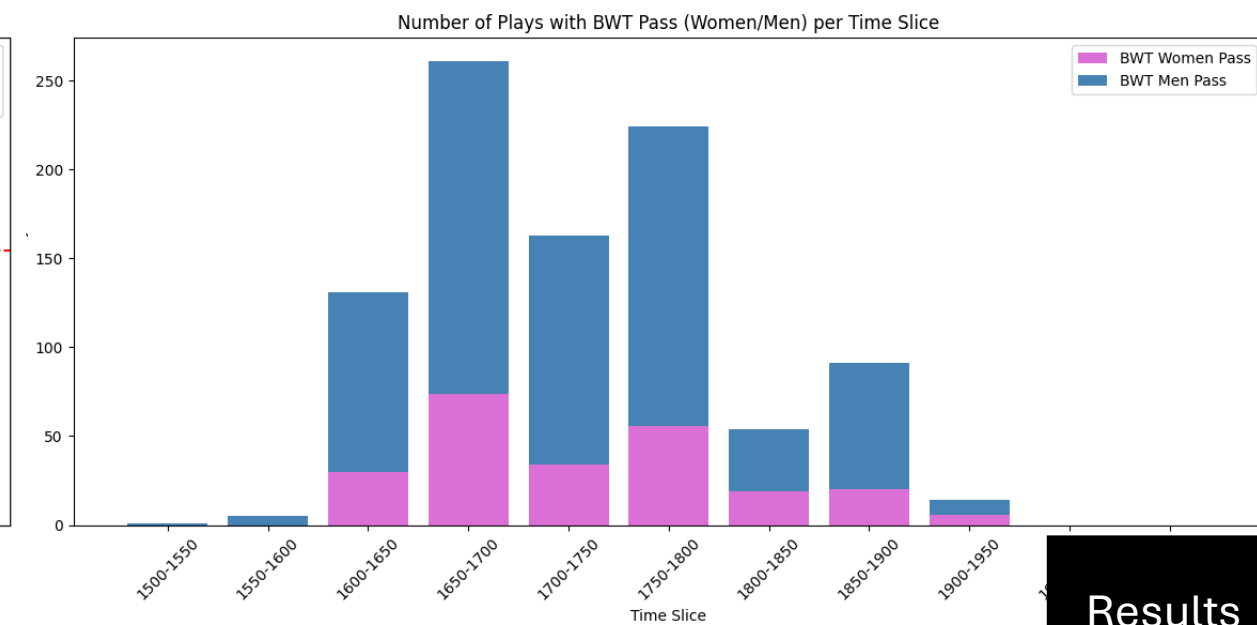
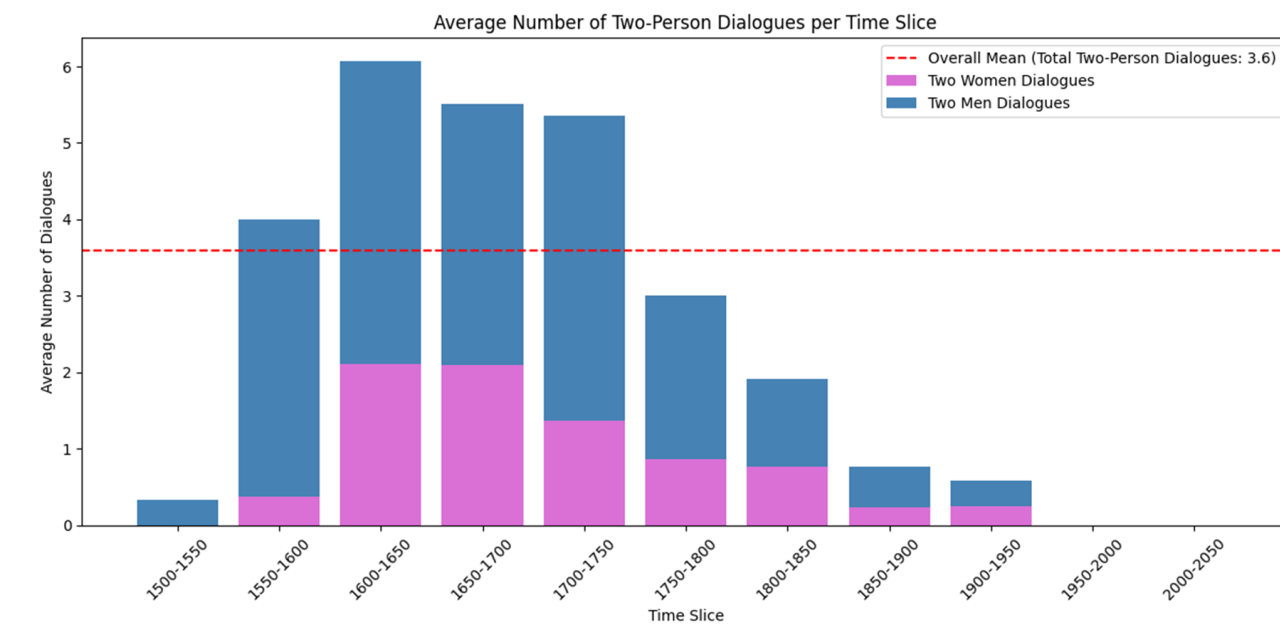
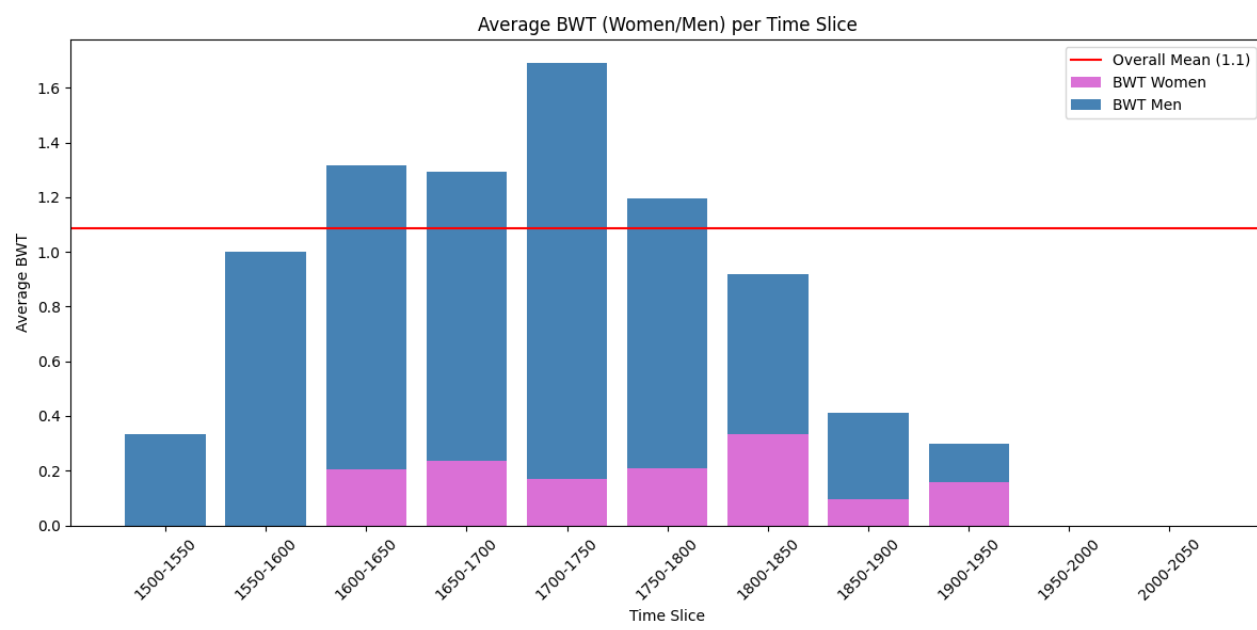
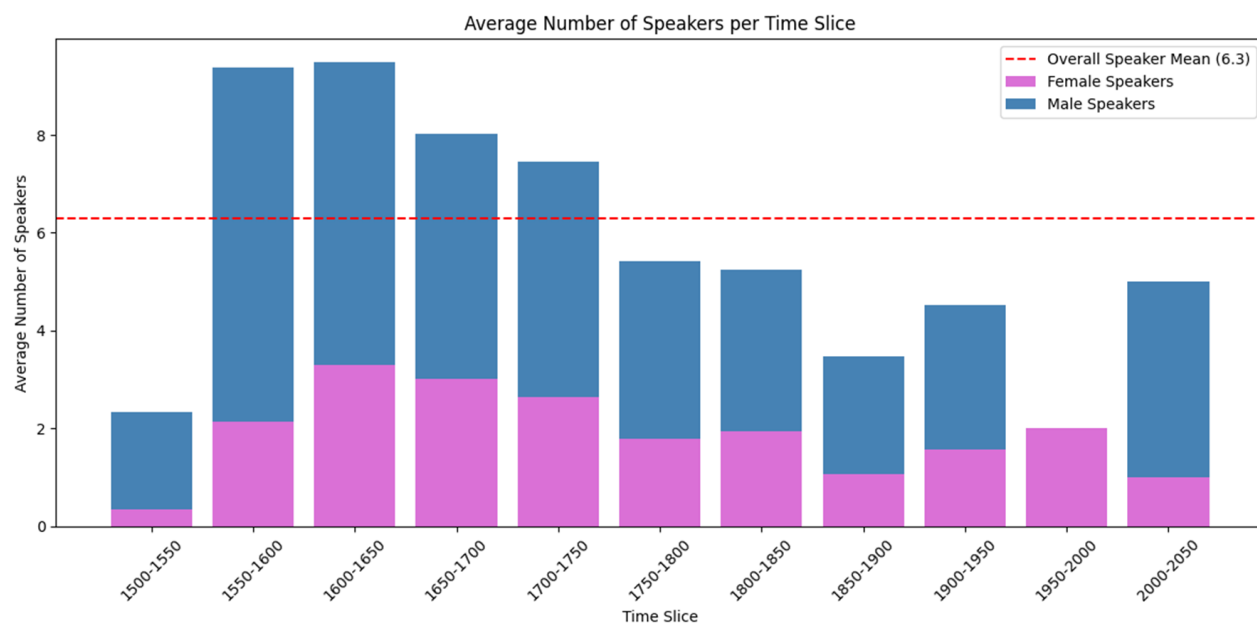
Average Number of scenes that pass inverted BWT per play



Average number of scenes that pass the BWT per play



Results



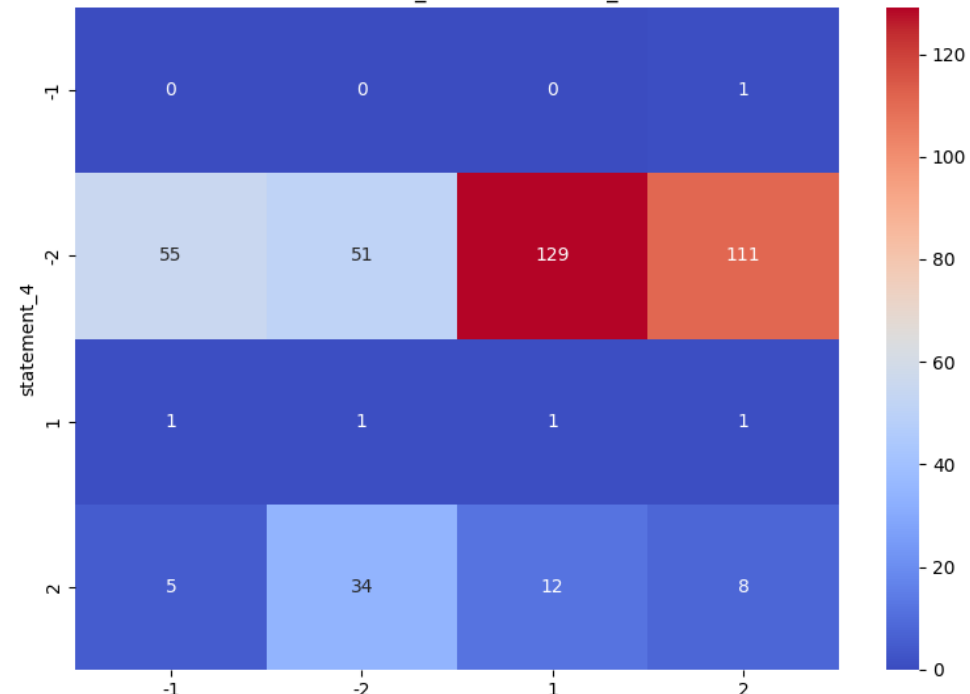
Combination: statement_4 and statement_5 1600-1650



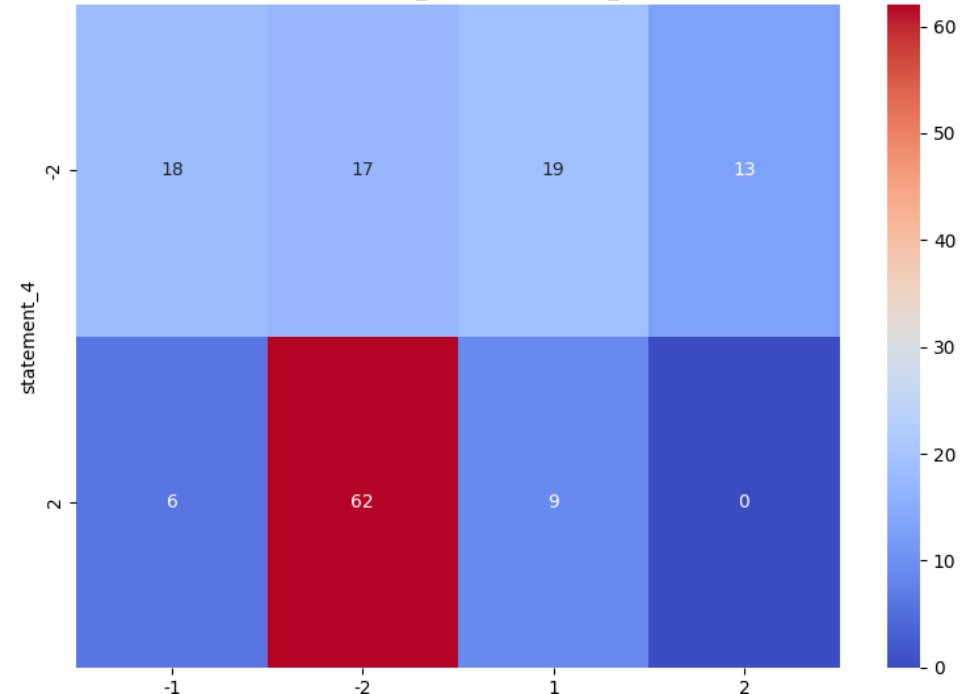
Combination: statement_4 and statement_5 1650-1700



Combination: statement_4 and statement_5 1700-1750



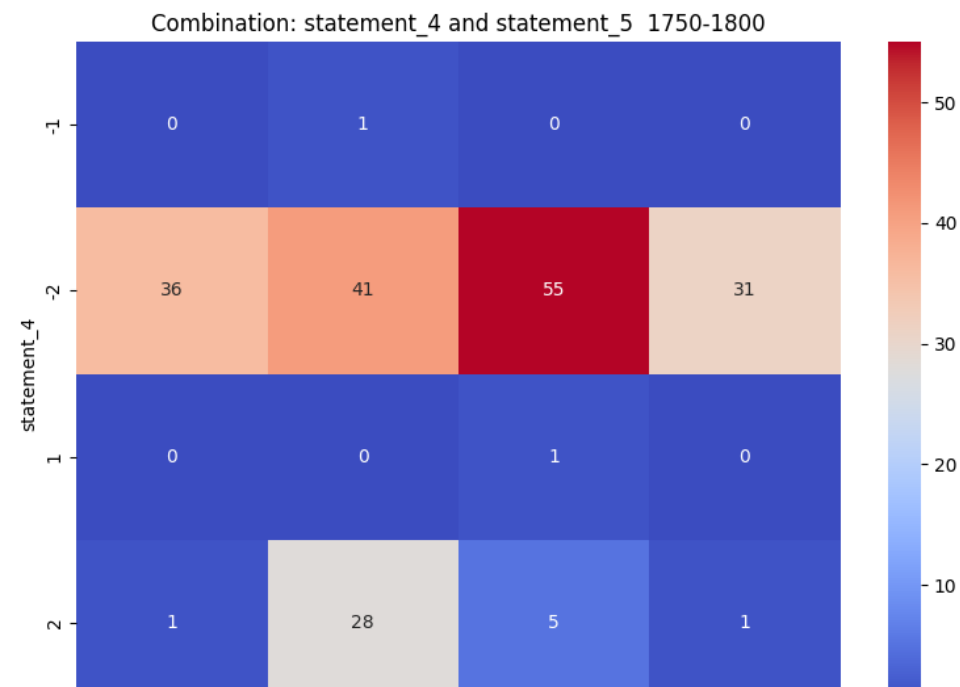
Combination: statement_4 and statement_5 1800-1850



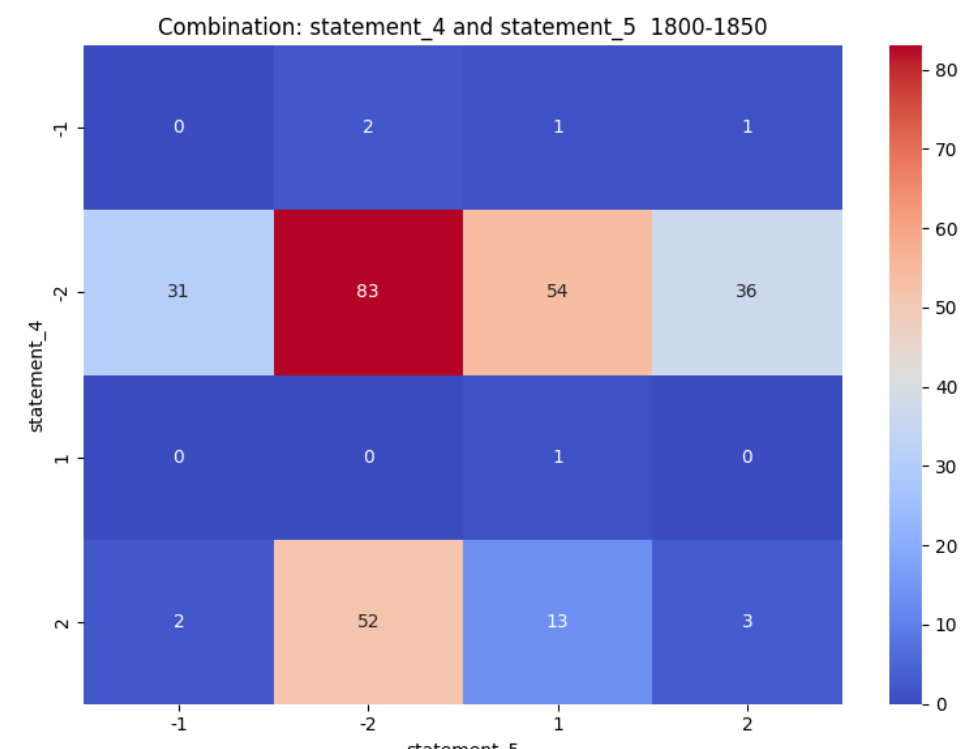
- Large proportion of pre 1800 scenes talk about marriage / relationships.
- Clear majority centered around a man / men.

An all-women scene is often a scene, in which women reveal relationship agendas concerning a certain man to the audience.

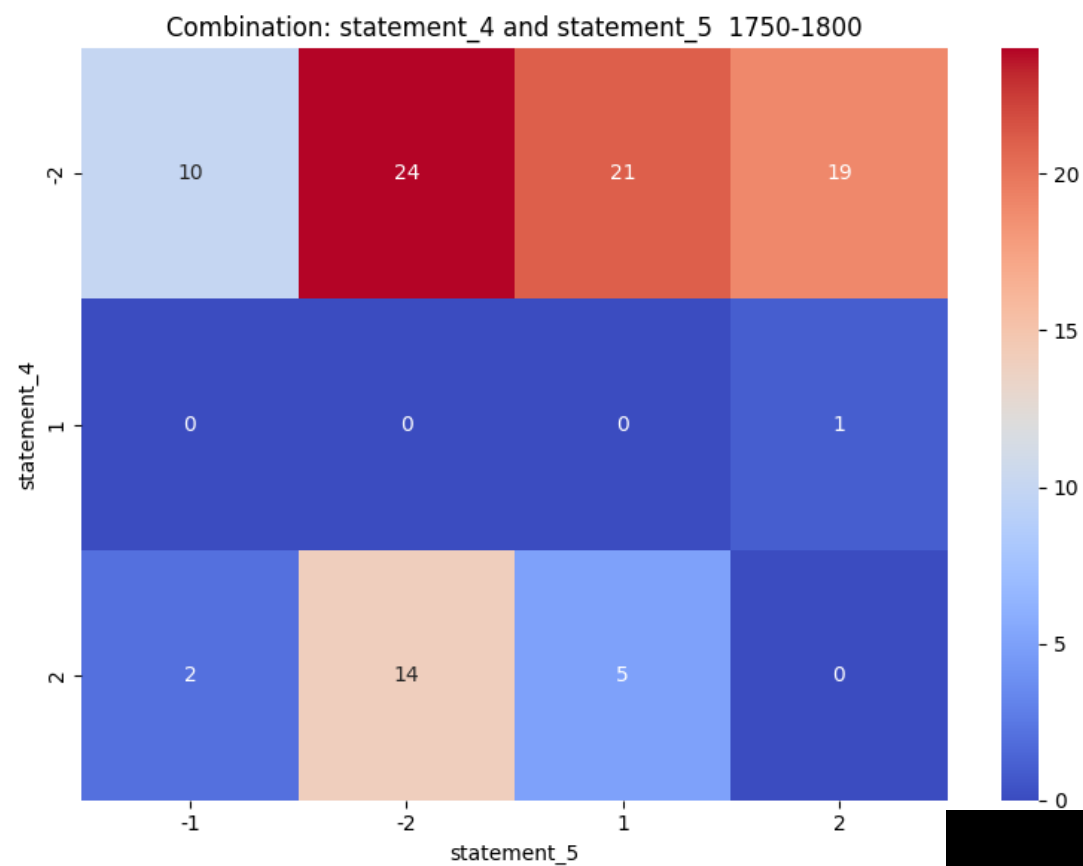
1800+ talks about relationships to men are not prominent anymore!



About a man and marriage



About a man –
but not
marriage

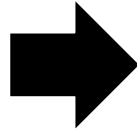


Results

What could possibly go wrong?

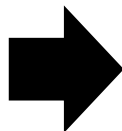
- Data
- Wrong parameters (Thinking models need creativity!)
- Too Long for context window
- No validated result after several tries
- SLLM applies prompt commands wrong
- SLLM does not understand text

Problem identified, but annotated in a way that is invisible for standard XSLT routines



```
<person xml:id="virgile" sex="UNKNOWN"><!--WARNING: no castItem  
found for reference in @who-->  
  <persName>Virgile</persName>  
</person>  
<person xml:id="sabine" sex="FEMALE">  
  <persName>Sabine</persName>  
</person>  
<person xml:id="camille" sex="FEMALE">  
  <persName>Camille</persName>  
</person>  
<person xml:id="virgilie" sex="FEMALE">  
  <persName>Virgilie</persName>  
</person>
```

Results in wrong information handed to the SLLM



Handelnde Personen:
Camille (weiblich), Virgile (UNKNOWN), Sabine (weiblich).

Take aways

Requirements engineering and Quality Management:

- What is the task?
- If a LLM replaces human judgment – how would a human judge?
- Model cases and expected results including edge cases
- Validate model, prompts and workflows in *Test Driven* approach
- Keep *thinking protocols*!
- Build in validation checks during runs

Choice of correct model

- Pure language models for Text generation (including summaries, translations)
- Reasoning models for Labelling
- Reasoning Models for Annotation
- Deterministic programming whenever possible (XSLT, Xquery, Python etc.)

Work around:

- Summaries can deal with context size problems
- Translations can deal with language understanding problems (both text generation, see above)

Energy

- Cloud solutions can be more energy efficient!

Scaling

- Scaling via multiple instances running at the same time.

Agentic DraCor and the Art of Docstring Engineering

Evaluating MCP-empowered LLM Usage of the DraCor API

Peer Trilcke, Ingo Börner, Henny Sluyter-Gäthje, Daniil Skorinkin, Frank Fischer
and Carsten Milling (special thanks to Stijn Meijers from Wolk)

University of Potsdam, Freie Universität Berlin

Workshop on Computational Drama Analysis, 3rd of September, 2025

How to Do Things With MCP Servers

 Welcome, Peer

How can I help you today?



Research

Claude Sonnet 4



Write



Learn



Code



Career chat



Claude



Based on my comprehensive analysis using the DraCor digital drama corpus, **Wilhelm Tell** emerges as Friedrich Schiller's most complex play overall, though different aspects of complexity point to different works.

Wilhelm Tell (1804) achieves the highest overall complexity through:

- **66 characters** - the largest ensemble in any Schiller play
- **534 network connections** - an exceptionally dense web of relationships
- **Multiple interwoven storylines** spanning personal, political, and mythic dimensions
- **Comprehensive social representation** from peasants to nobles

Humanities Infrastructures in the Era of Agentic AI

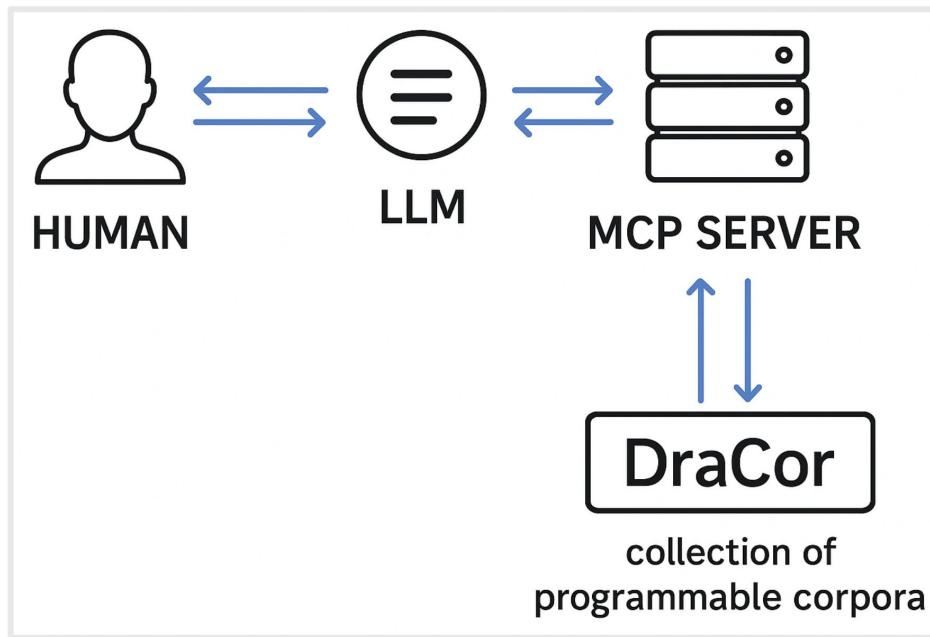
How can we reliably connect LLMs to our smart and open humanities data?

How can non-computational users interact with programmable corpora?

Making DraCor machine-actionable

Using a Model-Context Protocol (MCP) server

An MCP server exposes functionality to LLMs: so called tools



Implementing the DraCor MCP Server

DraCor MCP Server

- Built with Python package [FastMCP](#)
- “Tools” = decorated Python functions: `@tool()`
- Docstrings guide the LLM to choose the right tool and “instruct” it on its use

```
@mcp.tool()
def get_corpus_metadata(corpus_name: str):
    """Get extended metadata of all plays in a corpus

    Data is retrieved from the endpoint /corpora/{corpusname}/metadata

    If the data on the plays does not fit into the context use the tool `get_corpus_metadata_paged_helper` instead,
    which allows for retrieving metadata on the plays in batches.

    Args:
        corpus_name (str): Identifier of a corpus, e.g. `ger`, `rus`, `als`
    """
```

Tools in DraCor-MCP

1. Direct API Endpoint Wrappers
2. Helper Tools
3. Search and Discovery Tools
4. Administrative and Database Management Tools
5. Documentation and System Information Tools
6. Frontend Access and DraCor Research Integration

Experiments

Set-Up

- tool focus: 1, 2, 3
- qualitative-phenomenological descriptions of LLM **behaviour**
- eidetic variation of questions, they should cover
 - a spectrum of research questions
 - different epistemic objects
 - different ways of writing prompts
- output: markdown artifact with documentation and result

Varying Factors of the Questions

1. Scope: Play, Corpus, Corpora

Binary factors

2. Terminological Variation: characters vs. dramatis personae
3. DraCor specificity variation: French Drama vs. FreDraCor
4. Canonicity variation: *Dantons Tod* vs. *Der Nollhart*

Set of Questions

1. queries that target data for one play (5 variants)
2. queries that target statistics for a corpus (1 variant)
3. queries that target a comparison of statistics for multiple corpora (2 variants)
4. queries that target the combination of data for one corpus (4 variants)
5. queries that target the application of a literary concept (“protagonist”) on one play (4 variants)

→ 16 questions in total

Example Questions

ID	Question	Scope	Terminology	DraCor Specificity	Canonicity
1-1	What is the number of characters in Dantons Tod?	play	0	0	0
2-1	What is the mean number of characters in French Drama?	corpus	0	0	-
3-2	Which drama corpus covers the widest time range?	corpora	0	0	-
4-4	How does the percentage of female speakers in ItaDraCor change over time?	corpus	0	1	-
5-4	Who is the protagonist in Die entführte Dose?	play	1	0	1

Evaluation

Measure	Scale	Explanation
Correct Answer	wrong: 0; partly right (0.5); right (1)	Comparison of answer with actual answer
Tool Correctness	wrong: 0; partly right (0.5); right (1)	If the LLM decided to use the tool and the chosen tool can be used to handle the query
Tool-Calling Efficiency	very bad (1); bad (2) ok (3); good (4); perfect (5)	The processing path is evaluated, the shortest path is rated with 5, if a dead end is hit and for each additional step a point is deducted.
Tool-Use Reliability	not reliable (1) to reliable (5)	number of attempts with same answer (out of 5)

Evaluation

- 13 out of 16 answers correct (81%)
- 11 out of 16 answers reproducible (69%)
- 15 out of 16 times correct tool use (\neq tool was correctly used) (94%)
- 8 out of 16 times very efficient tool use (50%), worst score is 3

Problems

- maximum length limit
- batch queries not processed
- tool use knowledge is not developed

Effect of Variations

- Terminology: Influences the answer
- DraCor-Specificity: Influences the Tool-Calling Efficiency (between 4 and 5), but seems to negatively influence the reliability
- Canonicity: Does not influence the answer, when using the MCP

Outlook

Evaluation – Next Steps

- more formalized prompts with precise requests for metadata
- more formalized output with documentation and results
- further iterations of the questions
- testing over the Claude-API
- automation of the testing process

DraCor-MCP

Docstrings seem to be the magic glue ✨

- is that true?
- do we need to indulge in “docstring engineering”?

→ “Docstring variation method” to examine this suspicion

Data and Software

- Data:

- DraCor Data: <https://github.com/dracor-org>
- Documentation of the conversations with Claude:
https://github.com/dracor-org/dracor-mcp-evaluation/tree/main/2025_cda-preprint_documentation

- Code:

- DraCor API:
<https://github.com/dracor-org/dracor-api>
- DraCor-MCP: :
<https://github.com/dracor-org/dracor-mcp>
- MCP-Evaluation:
<https://github.com/dracor-org/dracor-mcp-evaluation>



**We are looking forward to
your ideas and thoughts!**

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Counting on messengers

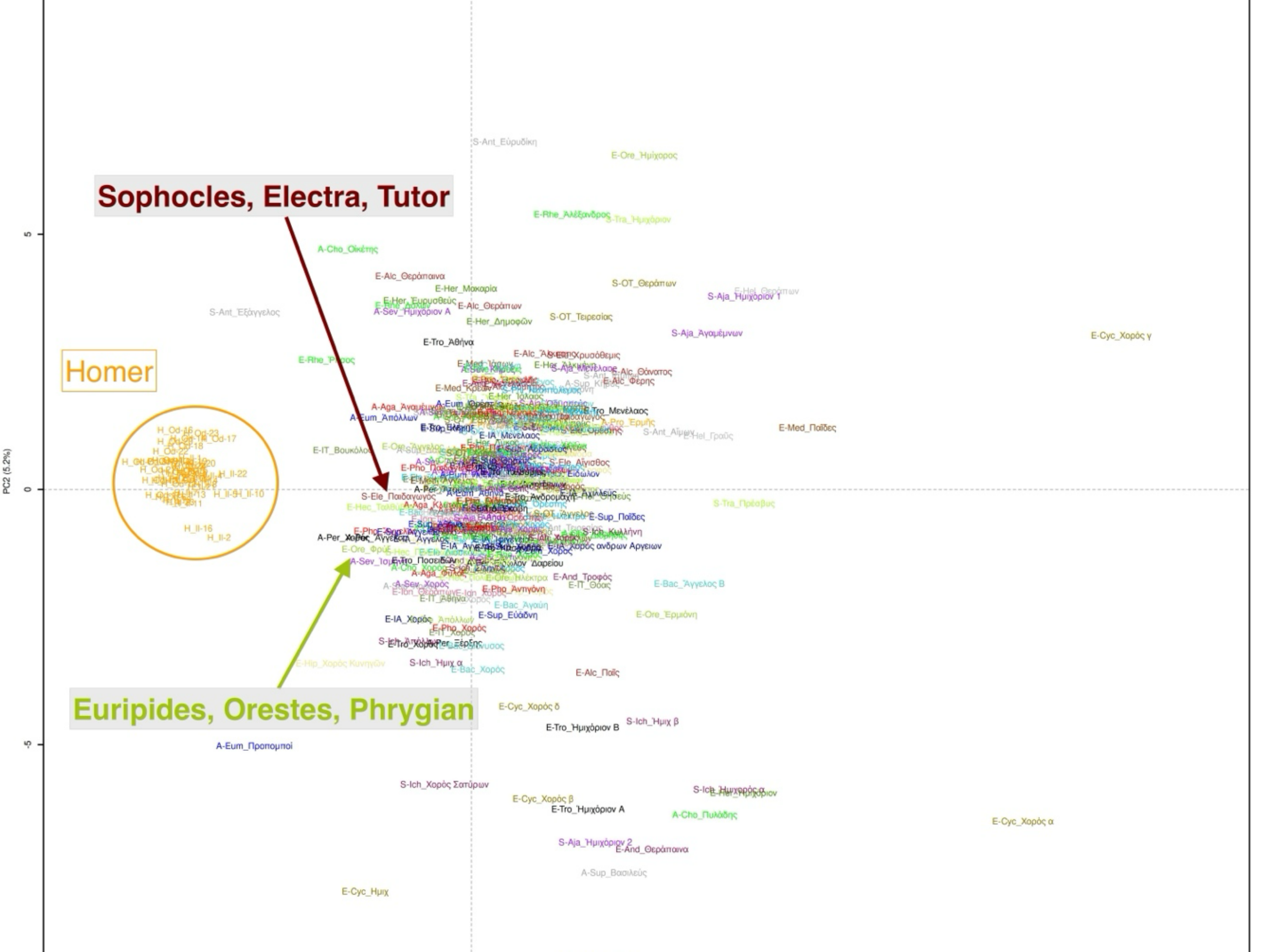
Towards a Computational Approach to News-Bringers in Ancient Greek Tragedy

Charles Pletcher (Tufts University) - DraCor Summit - 9 September 2025

Introduction

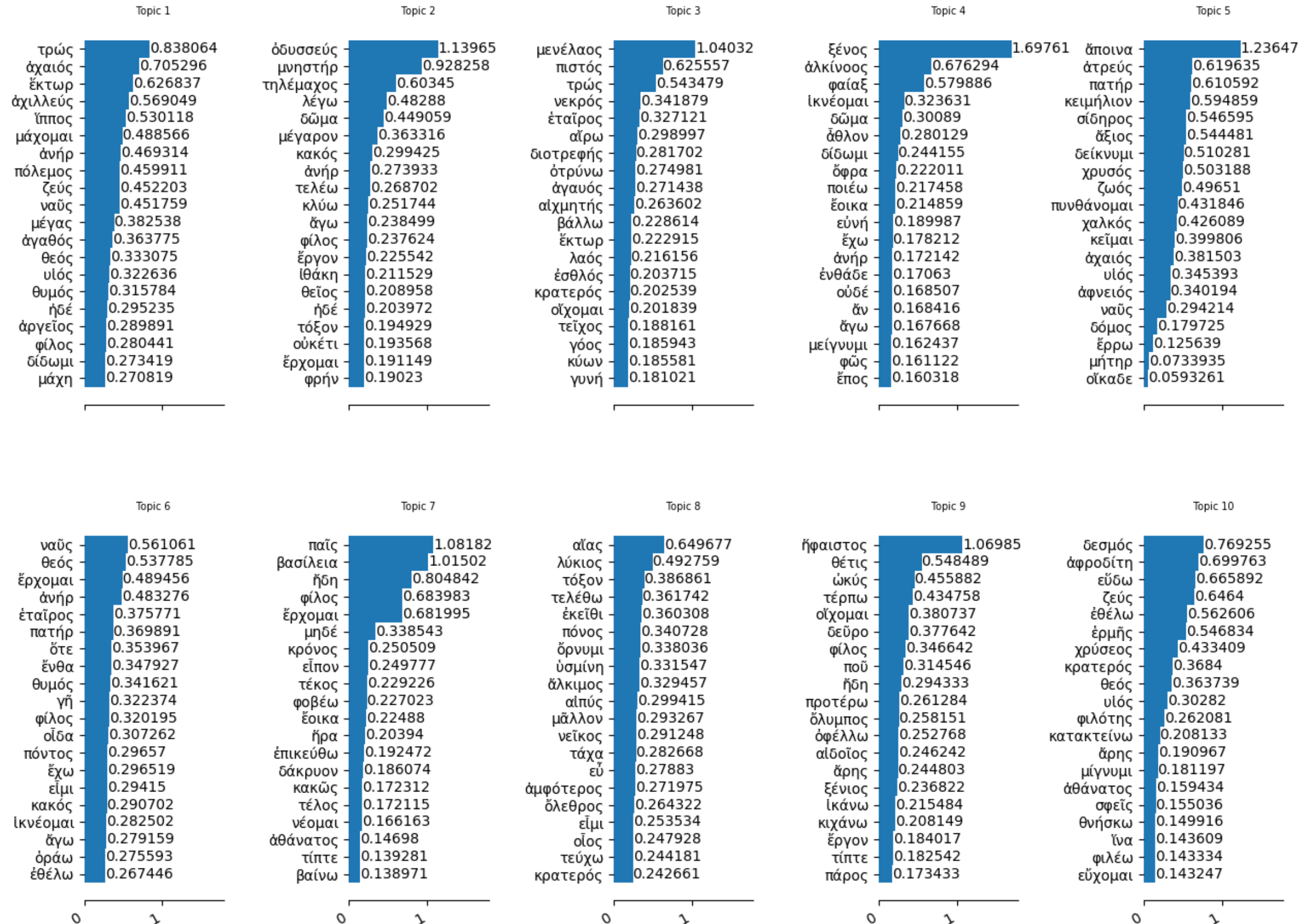
- Terracotta bell-krater (bowl for mixing wine and water), attributed to the Persephone Painter. ca. 440 BCE. The Metropolitan Museum 28.57.23.





What's the news?

Topics in Homeric NMF model (Frobenius norm)



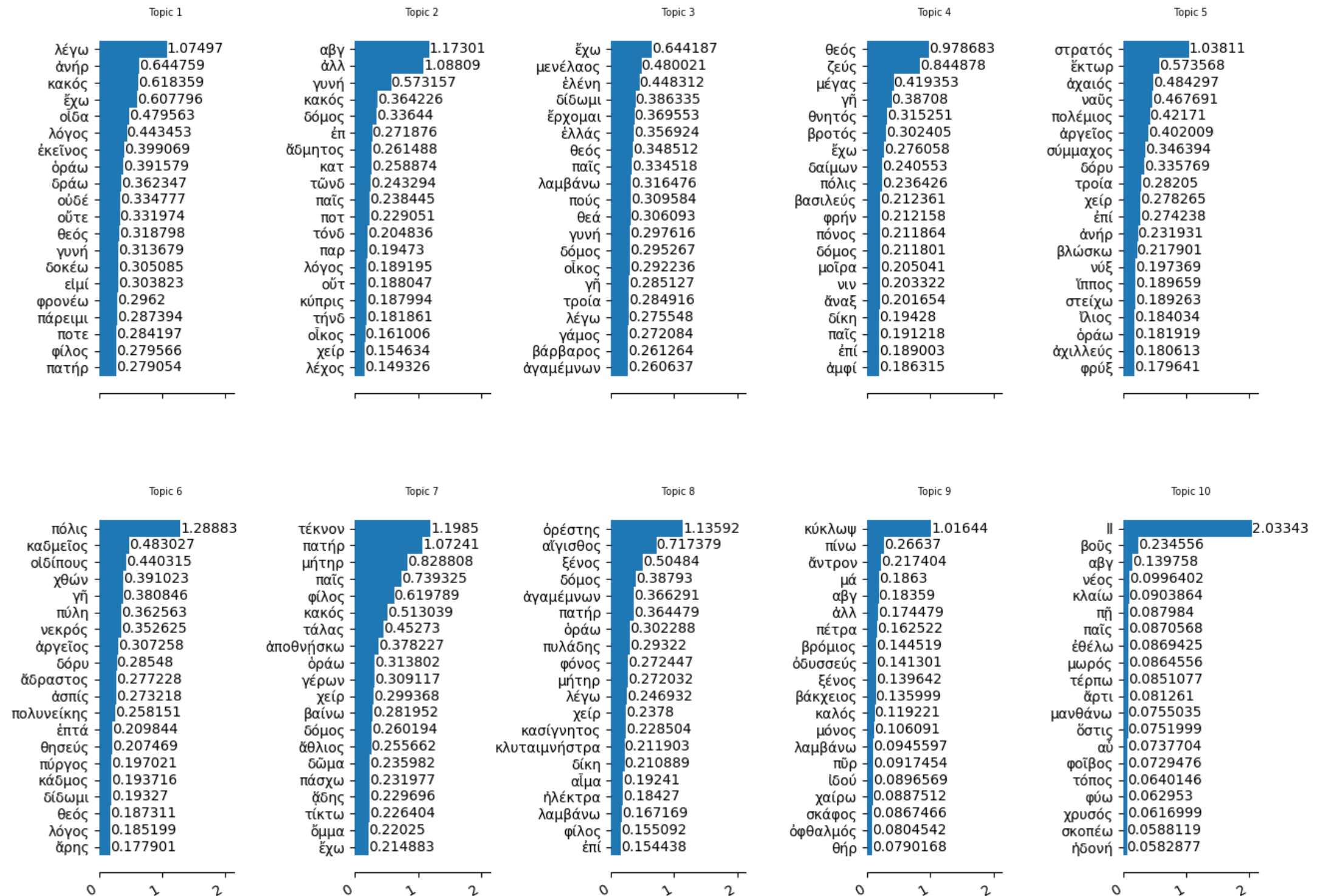
What's the news?

Key topics in Homer

- Homer 1
 - Troy
 - Achaean
 - Hector
 - Achilles
 - Horse
 - Do battle
 - Man
 - War
- Homer 2
 - Odysseus
 - Suitor
 - Telemachus
 - Speak
 - House
- Homer 10
 - Chain
 - Aphrodite
 - Sleep
 - Zeus
 - Be willing
 - Hermes
 - Golden

What's the news?

Topics in Tragic NMF model (Frobenius norm)



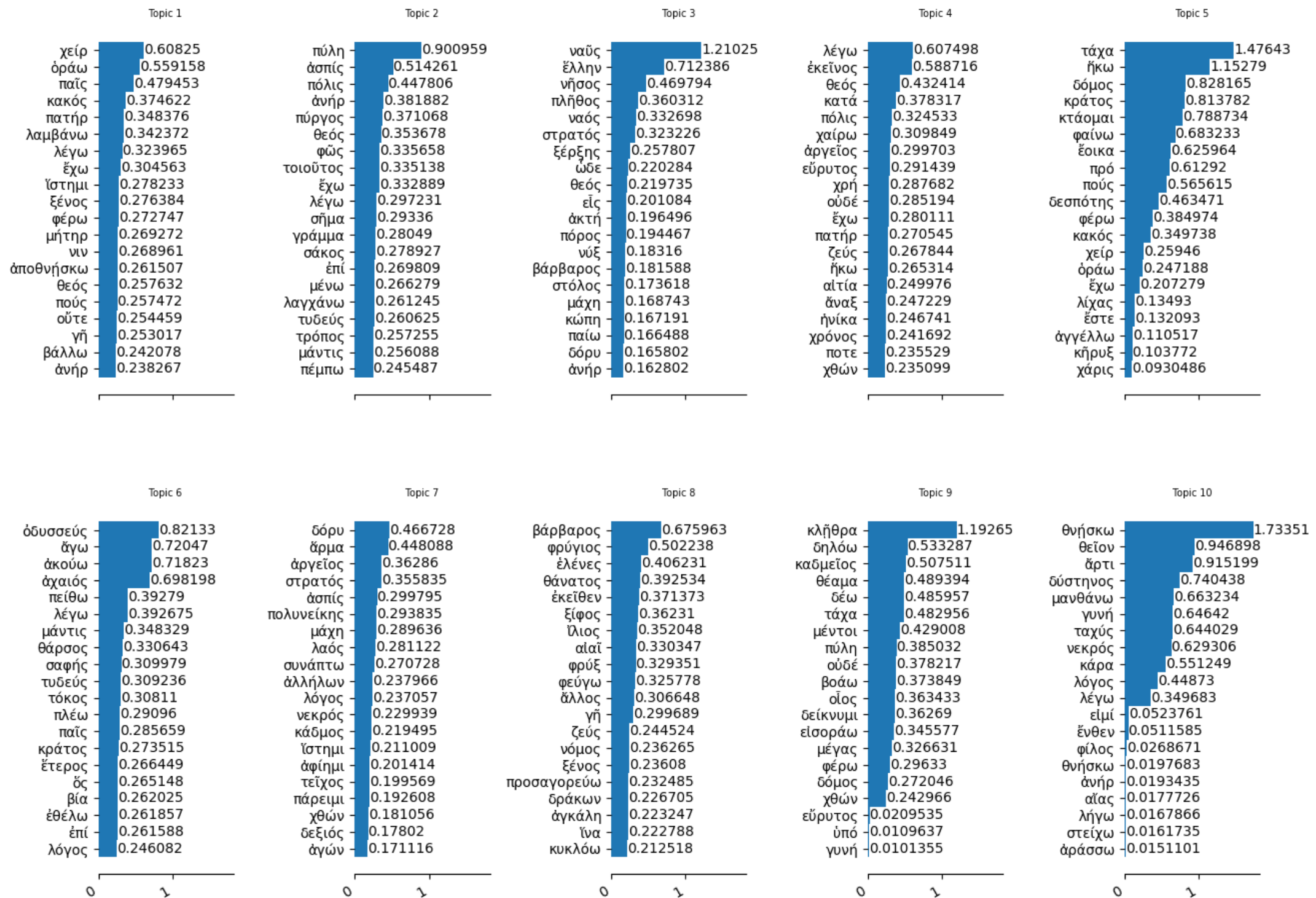
What's the news?

Key topics in Tragedy

- Tragedy 6
 - City
 - Cadmean
 - Oedipus
 - Land (chtōn)
 - Earth (gē)
- Tragedy 4
 - God(dess)
 - Zeus
 - Great
 - Earth (gē)
 - Mortal
 - Mortal
- Tragedy 5
 - Army
 - Hector
 - Achaean
 - Ship
 - Hostile
 - Argive
 - Ally
 - Spear
 - Troy

What's the news?

Topics in Messenger NMF model (Frobenius norm)

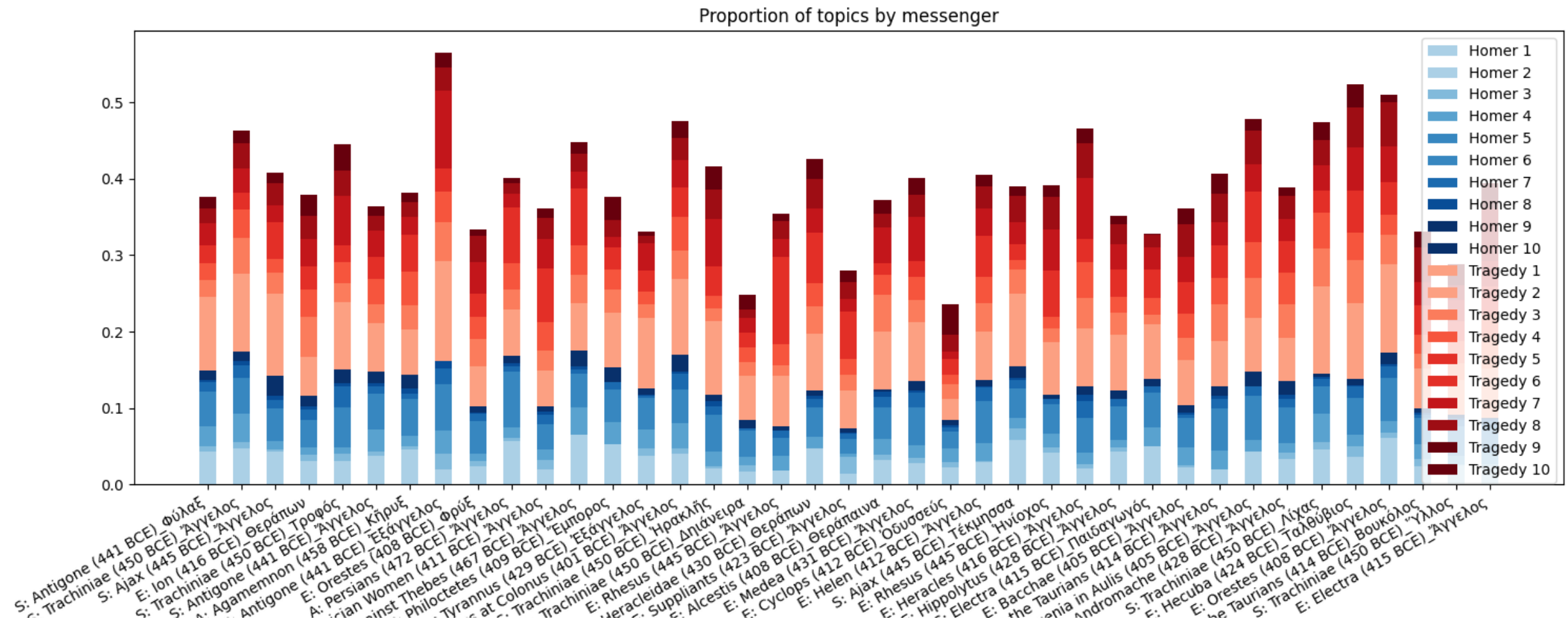


What's the news?

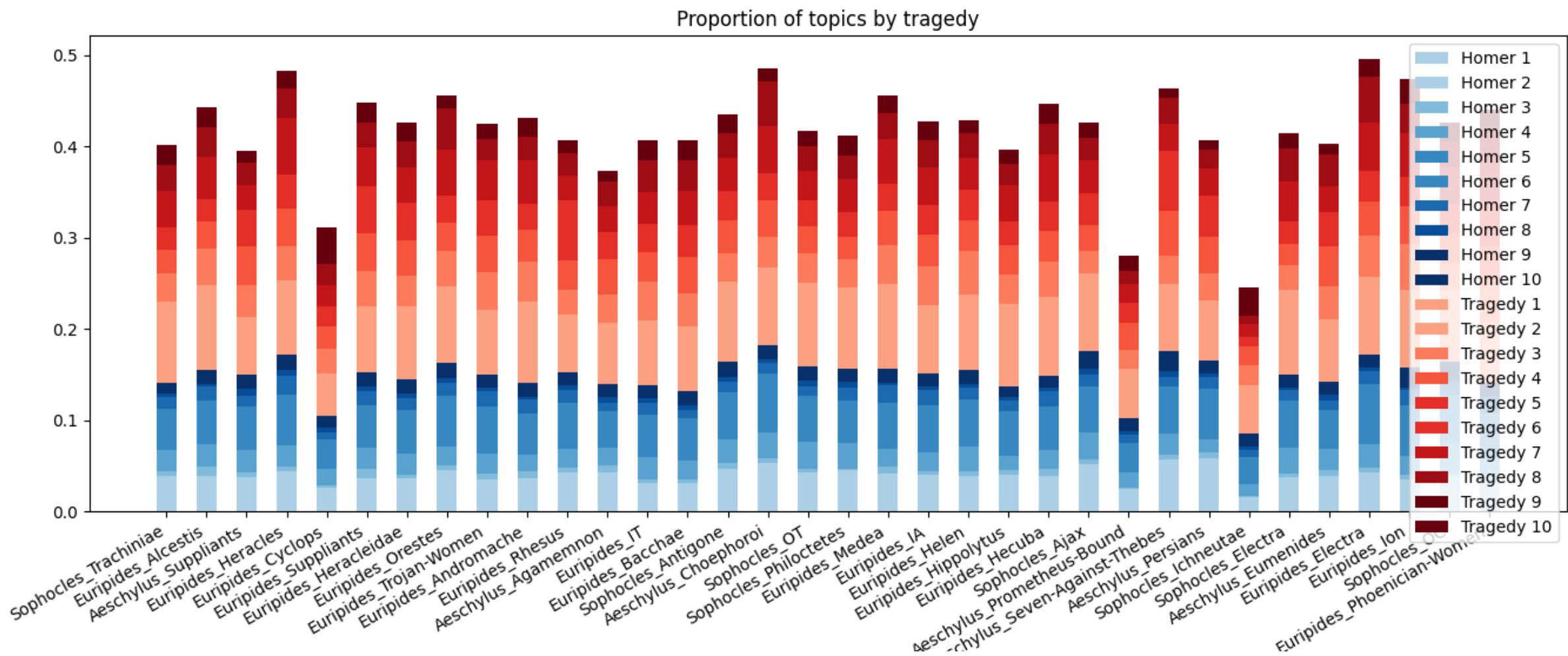
Key topics in Messenger Speeches

- Messenger 2
 - Gate
 - Shield
 - City
 - Man
 - Tower
 - God
 - Light
- Messenger 3
 - Ship
 - Hellene
 - Island
 - Temple
 - Army
 - Xerxes(?)
- Messenger 6
 - Odysseus
 - Bring
 - Listen
 - Achaean
 - Persuade
 - Speak
 - Seer

The very (topic) model of a modern major messenger?



Topics by tragedy

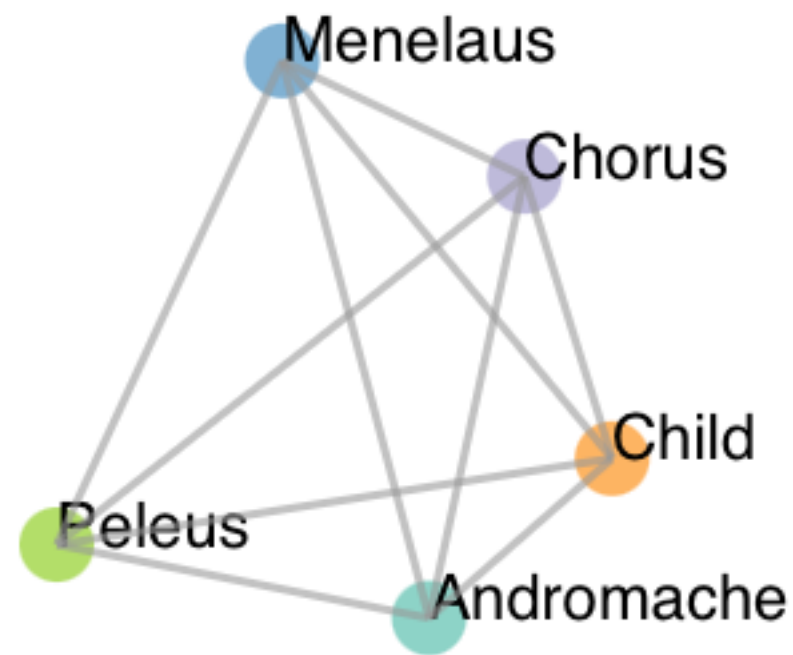


Audiences

The connection of these areas by central nodes has something to do with the concept of “protagonism,” understood as the idea of someone or something carrying the plot that (according to Aristotle) in a play regularly follows the “law of the single strand.” In addition, the connections between the areas can also be understood as an effect of the traditional form principle of *liaison des scènes* (even if this principle is not applied in a completely strict sense).

Trilcke et al. 2024, p. 22

Movable Networks?



Movable Networks?

Euripides' *Andromache*

<https://observablehq.com/@pletcher/networks-in-euripides-andromache>



Thank you!
Danke schön!

charles.pletcher@tufts.edu

[https://bsky.app/profile/
charlesplechter.org](https://bsky.app/profile/charlesplechter.org)

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Modeling Imitatio Character Alignment and Adaptation Strategies in Early Modern Drama

Lucas van der Deijl (University of Groningen)
Berlin, 3 September 2025

Case study: Iphigenia in DraCor

Gerard de Lairese, 'The Sacrifice of Iphigenia', pen and brown ink, 20.2x 16.3 cm, 1667-1688, Robert Lehman Collection, 1975.



Case study: Iphigenia in DraCor

1. Euripides, *Iphigenia in Aulis* (405 BCE) (GreekDraCor)
2. Euripides, *Iphigenia in Tauris* (414 BCE) (GreekDraCor)
3. Samuel Coster, *Iphigenia* (1617) (DutchDraCor)
4. Jean Rotrou, *Iphigénie* (1640) (FreDraCor)
5. Joost van den Vondel, *Ifigenie in Tauren* (1666) (DutchDraCor)
6. Jean Racine, *Iphigénie* (1674) (FreDraCor)
7. Michel Leclerc, *Iphigénie* (1675) (FreDraCor)
8. Nil Volentibus Arduum, *Ifigenia* (1678) (DutchDraCor)
9. Claude Guymond de la Touche, *Iphigénie en Tauride* (1757) (FreDraCor)
10. Maria G. de Cambon van der Werken, *Iphigenia in Tauris* (1771) (DutchDraCor)
11. Johann Wolfgang Goethe, *Iphigenie auf Tauris* (1787) (GerDraCor)



Contents

- Case study: Iphigenia in DraCor
- Definition: Imitatio
- Method: Character alignment
- Evaluation: Character alignment
- Metric: the Adaptation Index
- Evaluation: 25 Dutch adaptations
- Conclusion

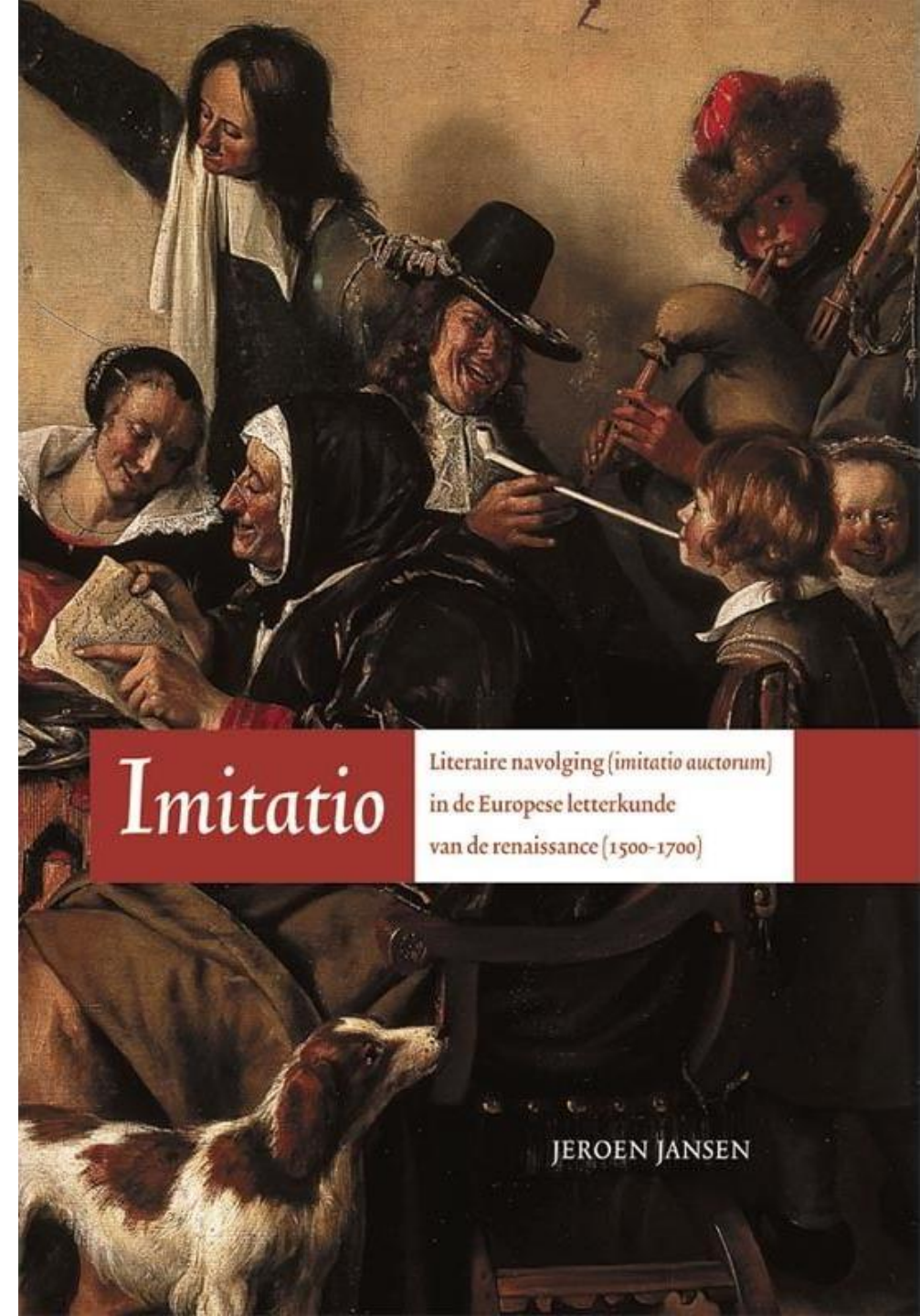


Jan Steen, 'The Sacrifice of Iphigenia', oil on canvas, 135x173cm, 1671. The Goudstikker Collection.

Definition: 'Imitatio'

‘a broad range of literary strategies to mimic the style, form, or plot of canonical literary works, such as citation, translation, paraphrase, imitation, analogy, adaptation et cetera.’

J. Jansen, *Imitatio: Literaire Navolging (Imitatio Auctorum) in De Europese Letterkunde Van De Renaissance (1500-1700)*, Verloren, Hilversum, 2008, p. 63-79.



Method: character alignment

Problem: how can we align character roles in parallel plays (source and translation) in different languages?

Assumption: equivalent characters from parallel plays tend to speak at similar length at similar moments in their version of the play.

Iphigénie by Jean Racine (1674)

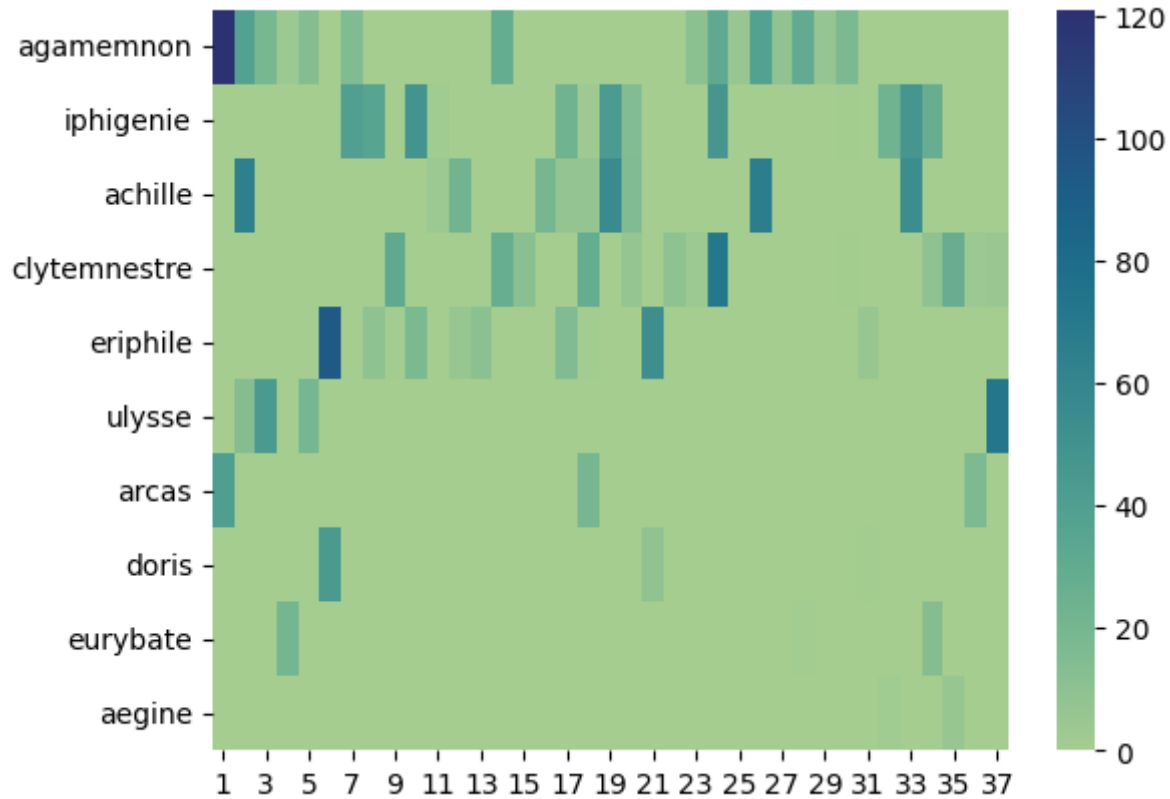


Ifigenia by Nil Volentibus Arduum (1678)

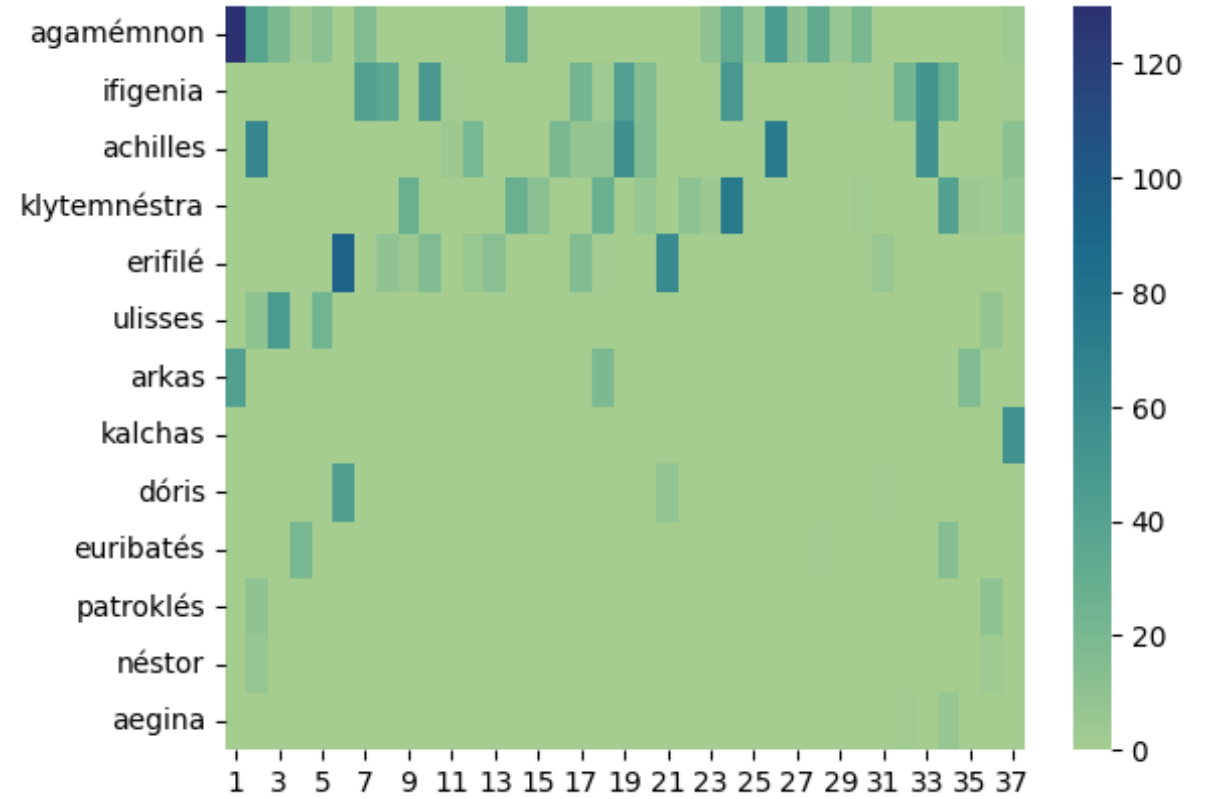


1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37

Method: character alignment



Iphigénie by Jean Racine (1674)



Ifigenia by Nil Volentibus Arduum (1678)

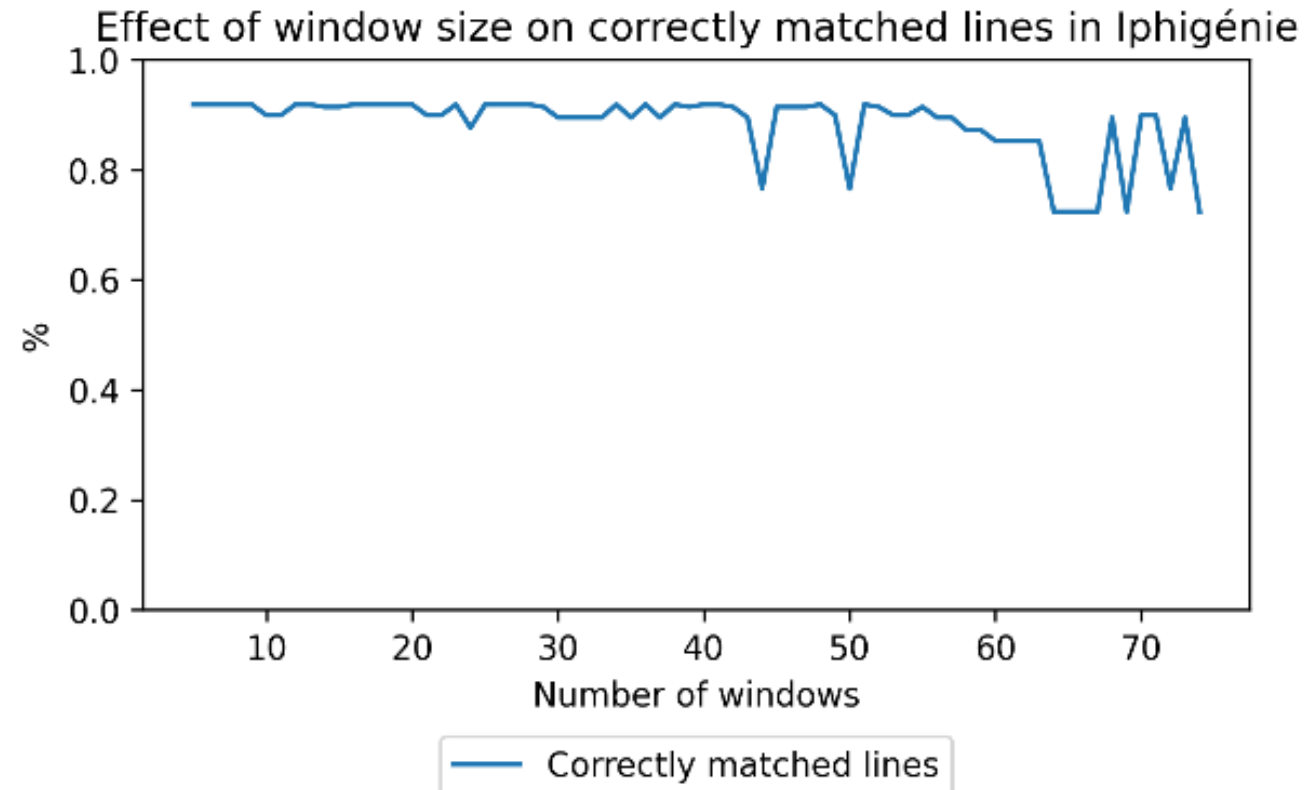
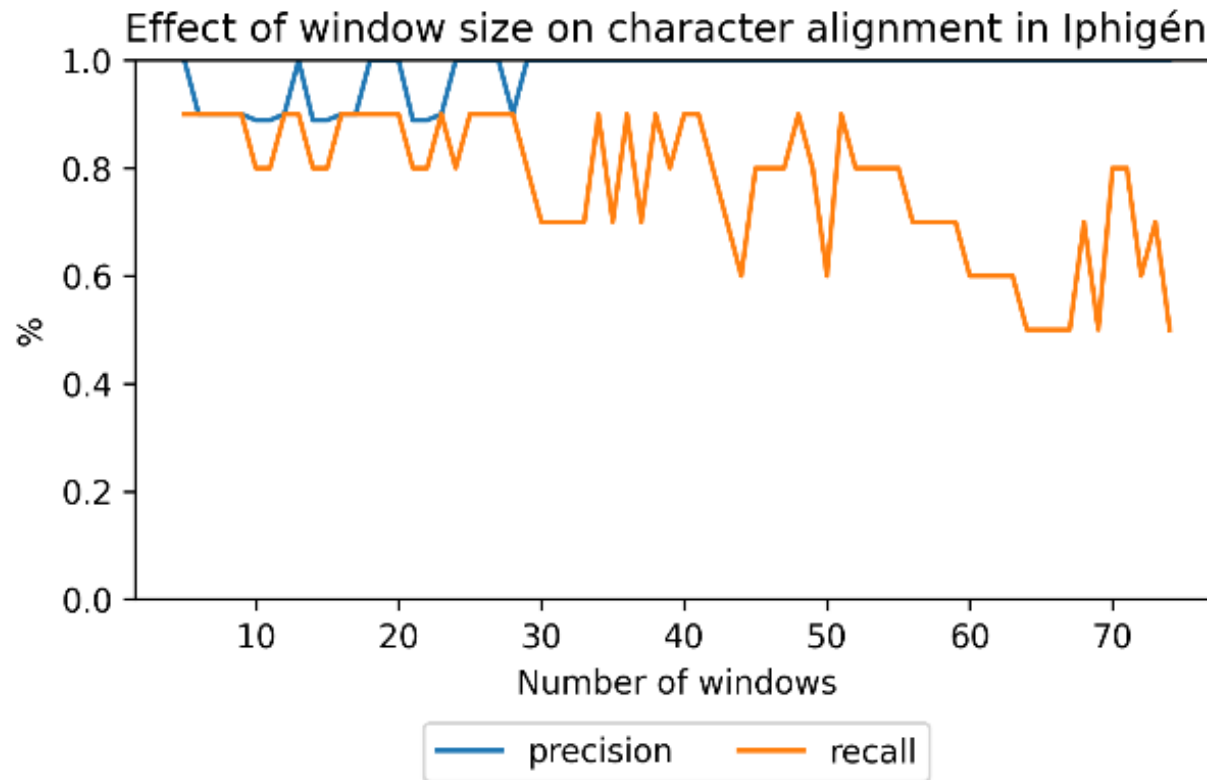
Method: character alignment

For each source and target play:

- Merge all lines and their speakers into one list.
- Divide this list in (x) non-overlapping windows.
- Count the number of lines for each character in each window.
- Create vectors of each character's distribution of lines over the windows.
- Extend each vector with character metadata: total number of lines, speeches, scene appearances and degree in the full play.
- Compute cosine similarity between vectors of each potential pair of characters from the source and the adaptation.
- Align the two characters with the highest cosine similarity if cosine similarity > .95.

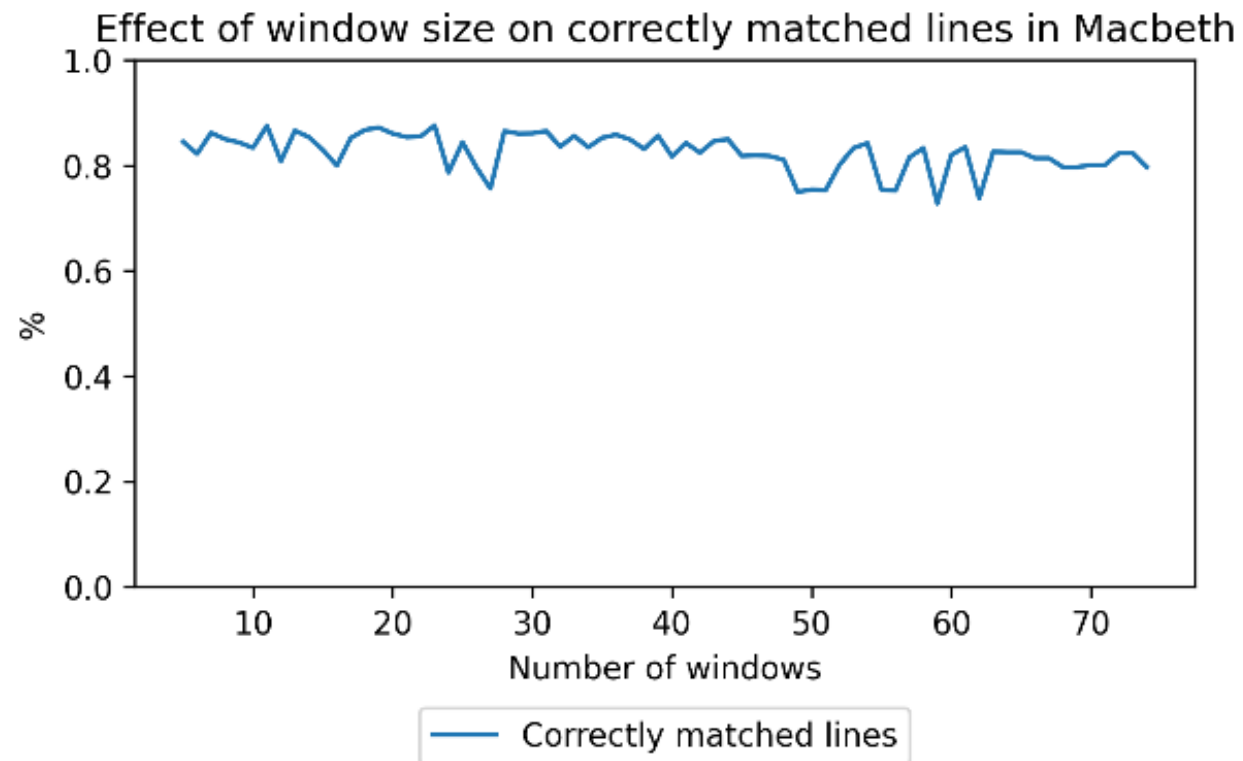
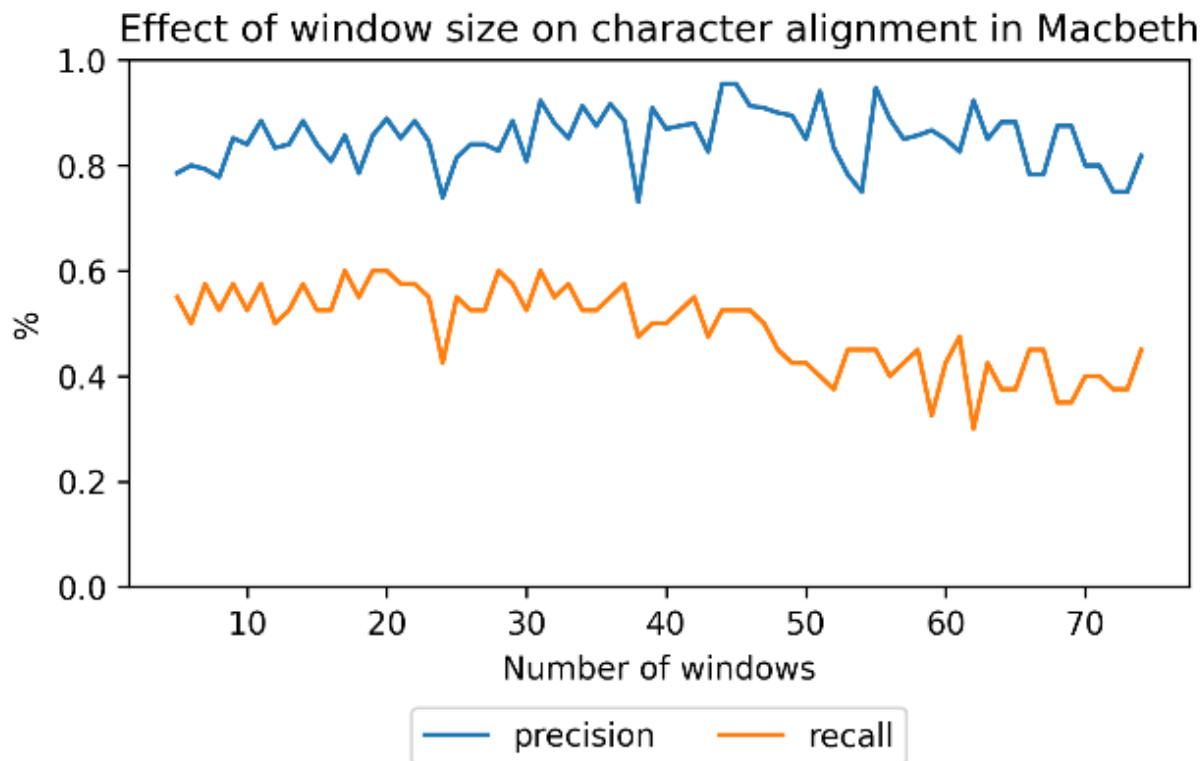
Evaluation: character alignment

Performance of character alignment in Nil Volentibus' 1678 Dutch translation of Jean Racine's *Iphigénie* for 5-75 windows.



Evaluation: character alignment

Performance of character alignment in Dorothea Tieck's 1832 German translation of *Macbeth* (available in the German Shakespeare Corpus) for 5-75 windows.



Metric: the Adaptation Index

The Adaptation Index equals an adaptation's average relative deviation (in %) from the source based on 5 variables:

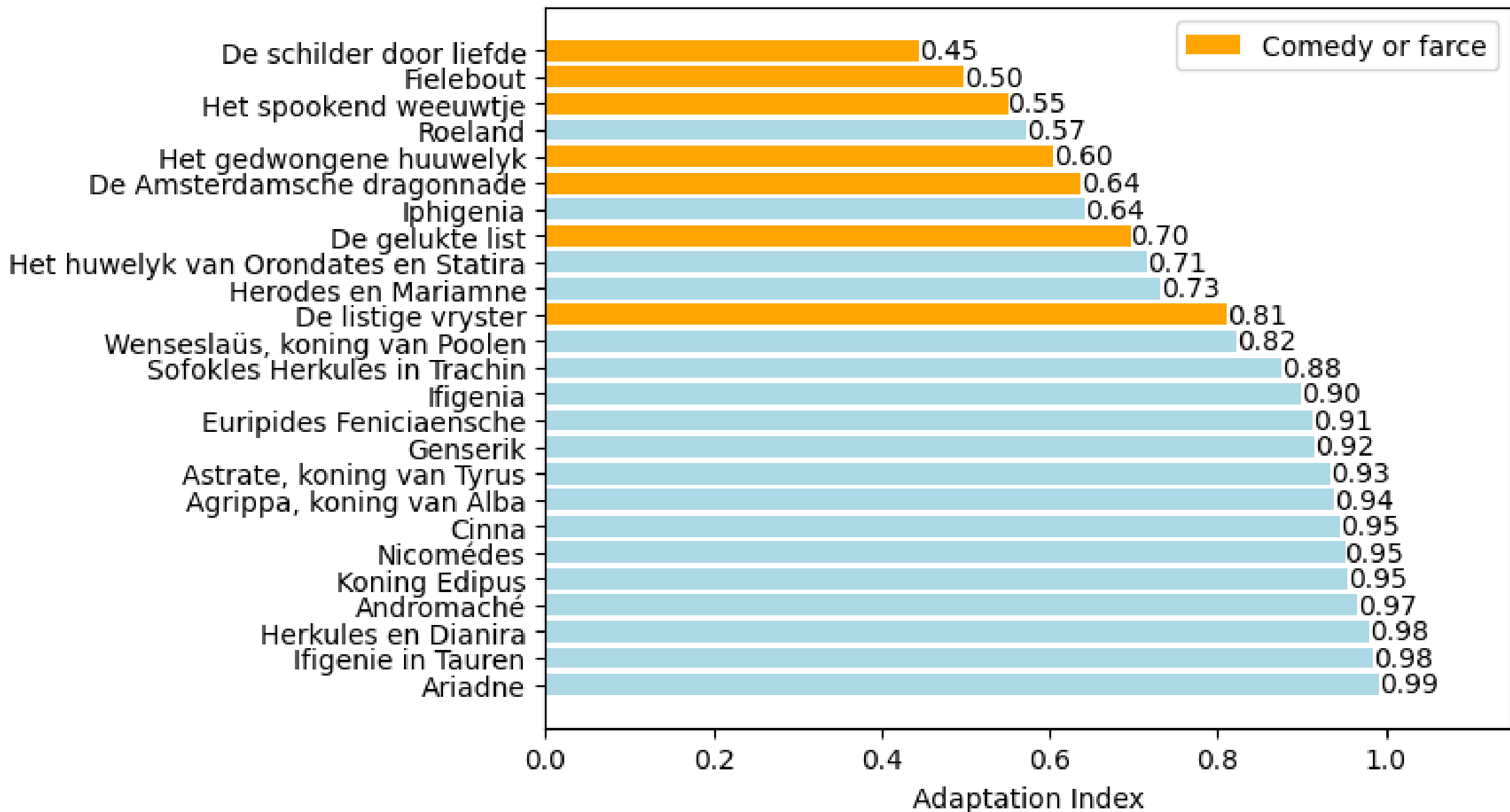
1. Total number of lines
2. Total number of speakers
3. Total number of speeches
4. Relative number of correctly aligned speakers
5. Relative number of correctly mapped lines

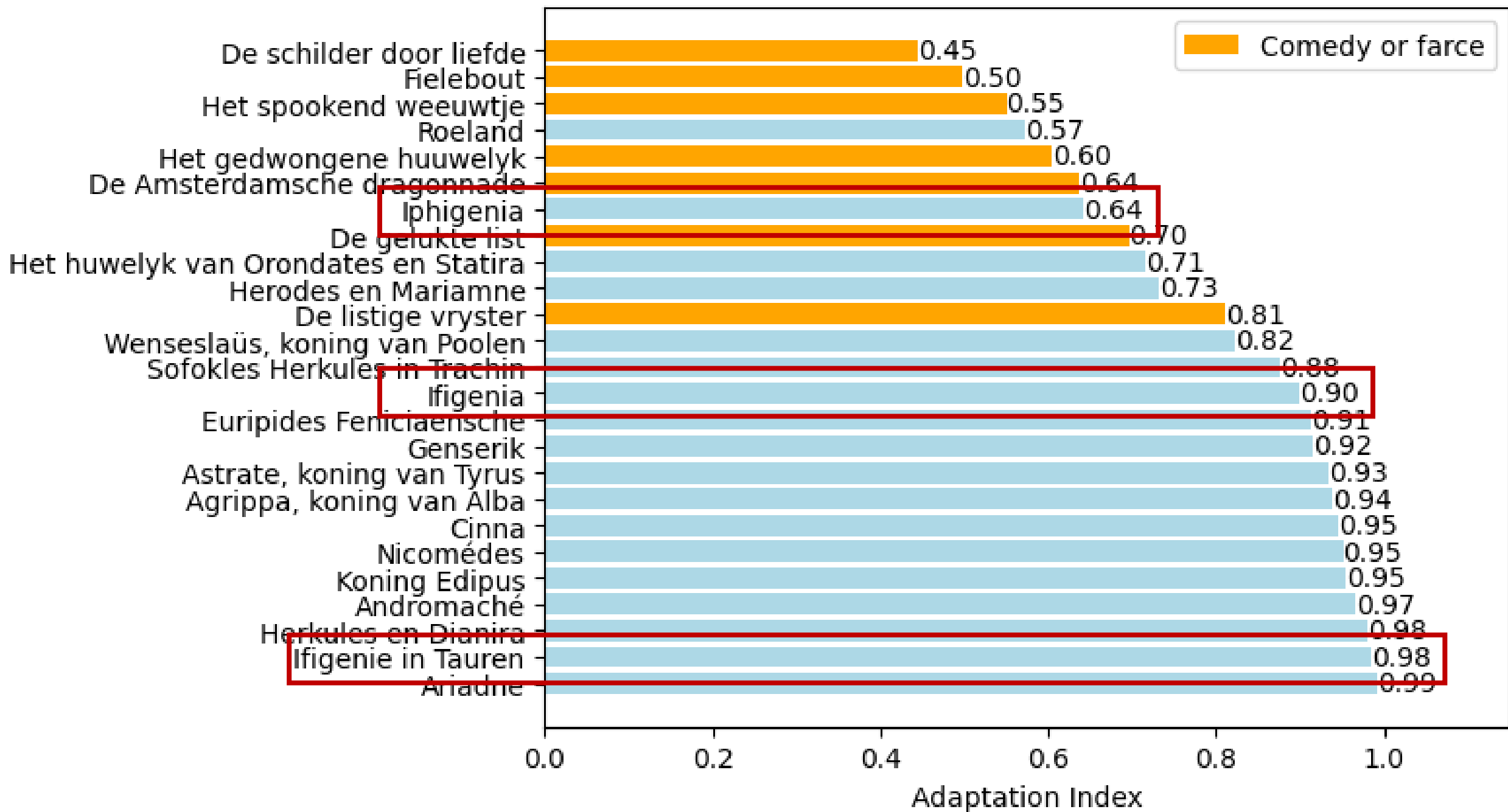
Evaluation: The Adaptation Index

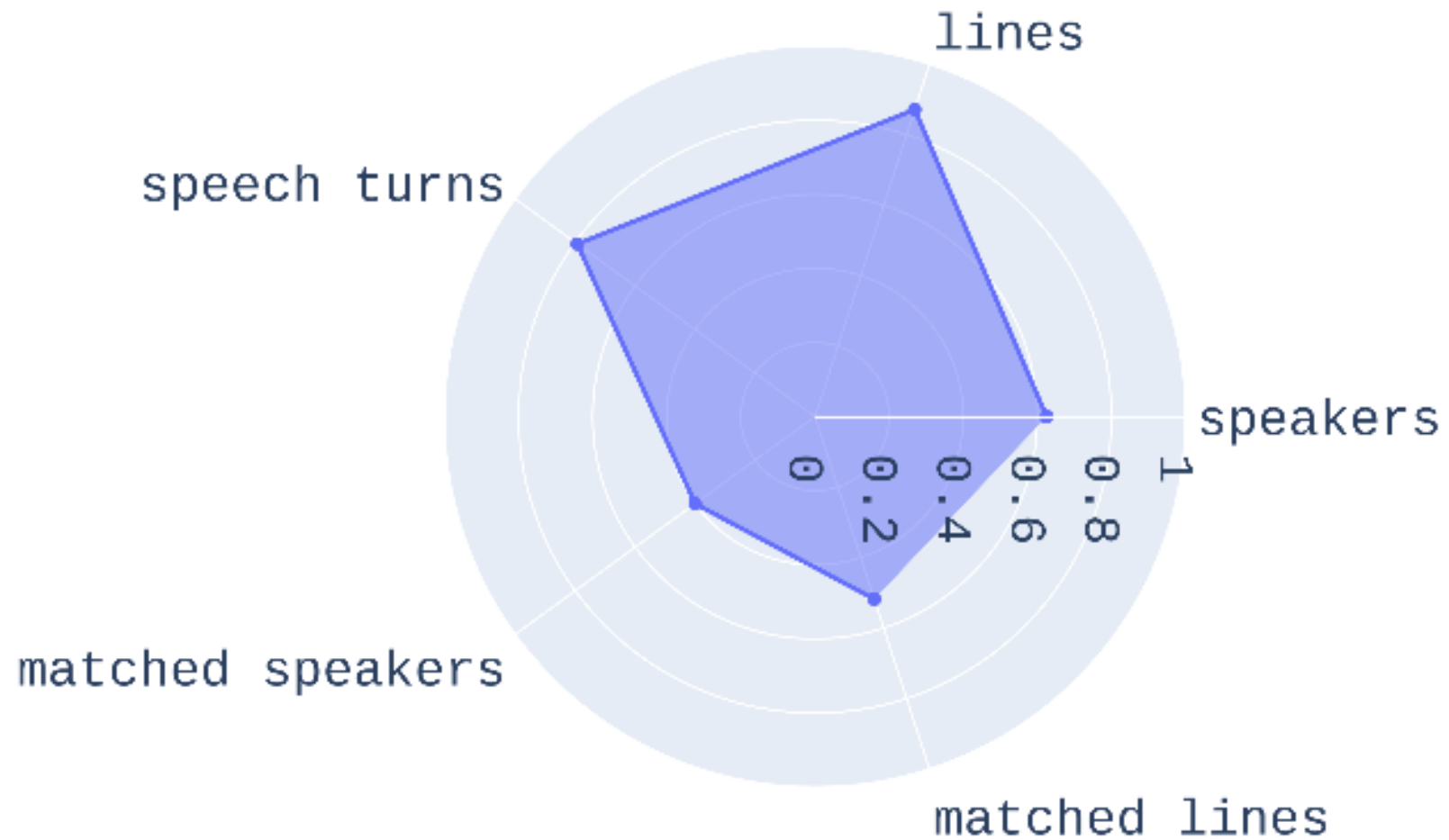
Corpus:

25 Dutch adaptation (1617-1714)
from DutchDraCor of Greek,
Spanish or French plays from
GreekDraCor, CalDraCor and
FreDraCor.

Author source	Title source	Author adaptation	Title adaptation
Euripides	<i>Iphigenta in Aulis</i> (405 BCE)	Samuel Coster	<i>Iphigenta</i> (1617)
Euripides	<i>Phoenissae</i> (411 BCE)	Joost van den Vondel	<i>Euripides Fenijsche</i> (1668)
Euripides	<i>Iphigenta in Tauris</i> (414 BCE)	Joost van den Vondel	<i>Ifigente in Tauren</i> (1666)
Sophocles	<i>Oedipus Tyrannus</i> (429 BCE)	Joost van den Vondel	<i>Koning Edipus</i> (1660)
Sophocles	<i>Trachiniae</i> (450–425 BC)	Joost van den Vondel	<i>Sofokles Herkules in Trachin</i> (1668)
Pedro Calderón de la Barca	<i>La dama duende</i> (1636)	Nil Volentibus Arduum	<i>Het spookend weeuwtje</i> (1670)
François Tristan l'Hermite	<i>Martane</i> (1644)	Katharyne Lescailje	<i>Herodes en Mariamne</i> (1685)
Jean Magnon	<i>Le Mariage d'Orondate et de Statira</i> (1648)	Nil Volentibus Arduum	<i>Het huwelyk van Orondates en Statira</i> (1670)
Jean de Rotrou	<i>Venceslas</i> (1648)	Katharyne Lescailje	<i>Wenceslaus, koning van Polen</i> (1686)
Pierre Corneille	<i>Nicomède</i> (1651)	Katharyne Lescailje	<i>Nicomédès</i> (1692)
Molière	<i>Le Sicilien</i> (1655)	Nil Volentibus Arduum	<i>De schilder door liefde</i> (1682)
Molière	<i>L'École des Maris</i> (1661)	Nil Volentibus Arduum	<i>De listige vryster</i> (1690)
Philippe Quinault	<i>Agrippa Roi d'Albe ou Le Faux Tibertinus</i> (1663)	Nil Volentibus Arduum	<i>Agrippa, koning van Alba</i> (1669)
Molière	<i>Le Mariage Forcé</i> (1664)	Nil Volentibus Arduum	<i>Het gedwongene huwelyk</i> (1682)
Molière	<i>Le Médecin Malgré Lui</i> (1666)	Nil Volentibus Arduum	<i>Plelehout</i> (1680)
Jean Racine	<i>Andromaque</i> (1668)	Nil Volentibus Arduum	<i>Andromaché</i> (1678)
Adrien-Thomas Perdou de Subigny	<i>La Folle Querelle ou La Critique d'Andromaque</i> (1668)	Nil Volentibus Arduum	<i>De gelukke list</i> (1682)
Philippe Quinault	<i>Astrate Roi de Tyr</i> (1670)	Nil Volentibus Arduum	<i>Astrate, koning van Tyrus</i> (1670)
Pierre Corneille	<i>Artane</i> (1672)	Katharyne Lescailje	<i>Artadne</i> (1693)
Jean Racine	<i>Iphigénie</i> (1674)	Nil Volentibus Arduum	<i>Ifigenta</i> (1678)
Antoinette du Ligier de la Garde	<i>Genseric</i> (1680)	Katharyne Lescailje	<i>Gensertik</i> (1685)
Deshoulières			
Jean François Juvénon de La Thuillerie	<i>Hercule</i> (1681)	Katharyne Lescailje	<i>Herkules en Diantra</i> (1688)
Pierre Corneille	<i>Cinna</i> (1682)	Nil Volentibus Arduum	<i>Cinna</i> (1680)
Philippe Quinault	<i>Roland</i> (1685)	Nil Volentibus Arduum	<i>Roeland</i> (1686)
Joseph Desmarres	<i>Merlin Dragon ou La Dragonne</i> (1690)	Nil Volentibus Arduum	<i>De Amsterdamsche dragonnade</i> (1714)

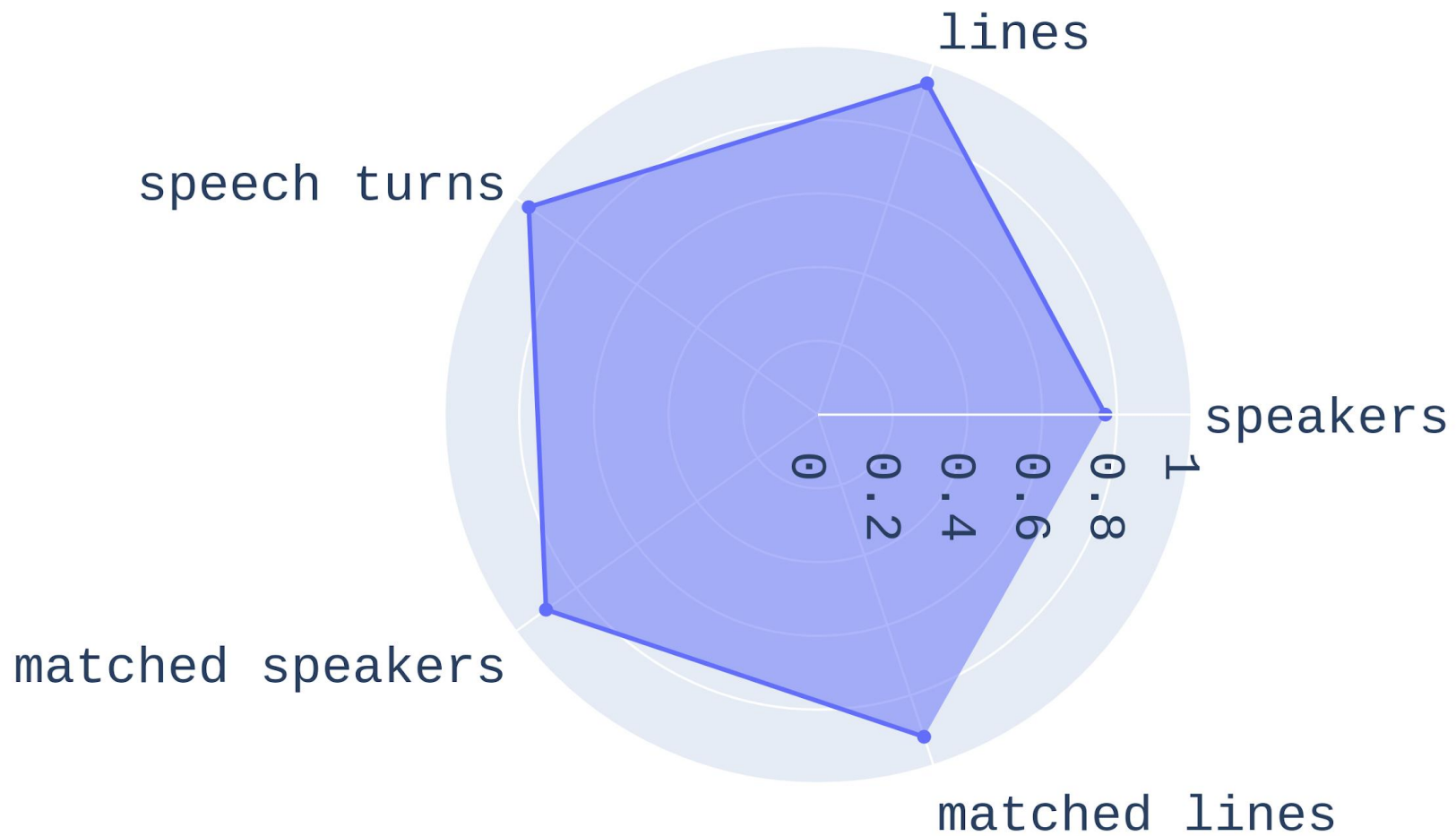






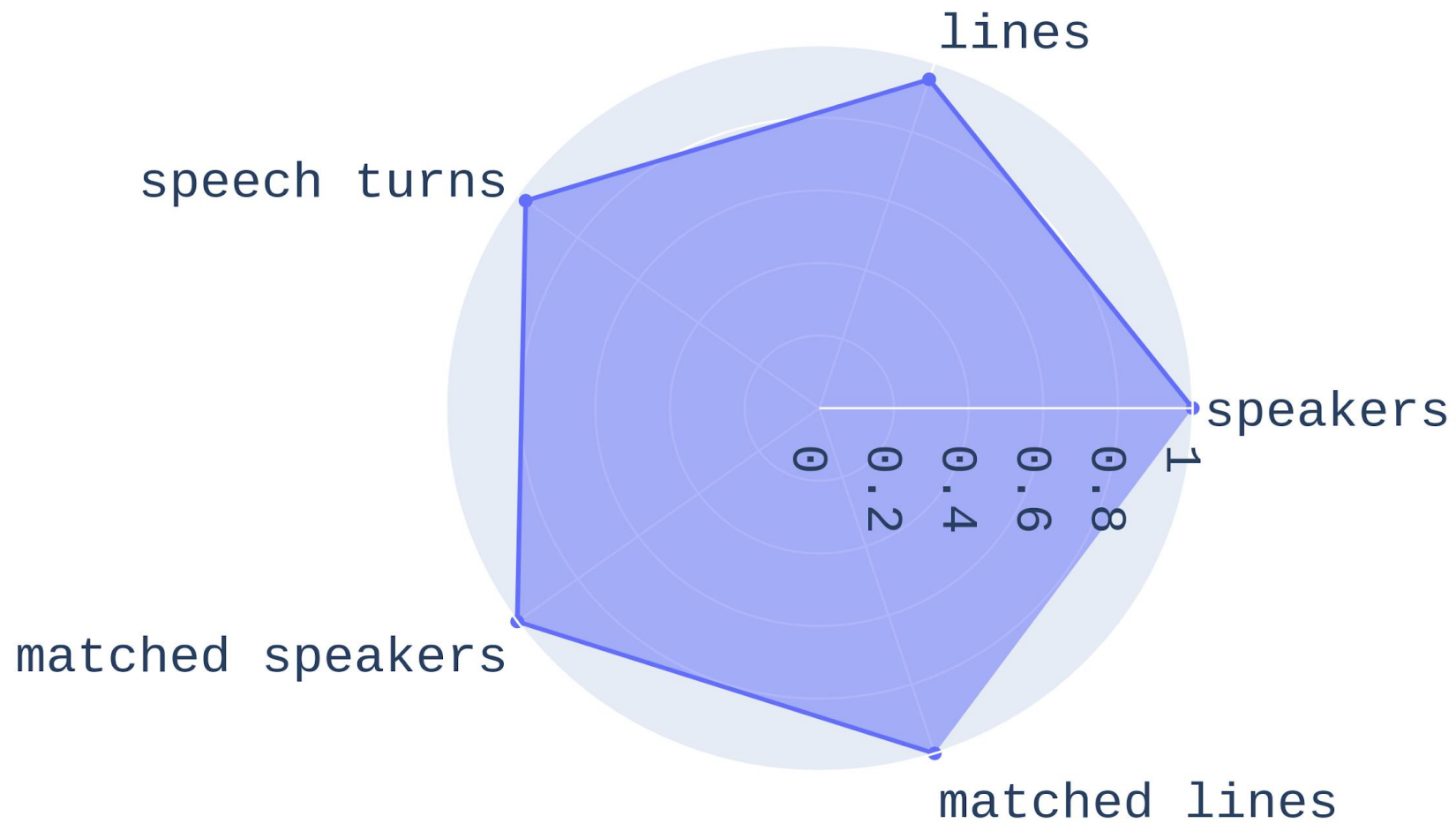
Iphigenia by Coster (1617) versus *Iphigenia in Aulis* (405 BCE) by Euripides

Adaptation Index = 0.64



Ifigenia by Nil Volentibus Arduum (1678) versus *Iphigénie* by Racine (1674).

Adaptation Index = 0.90



Ifigenie in Tauren by Vondel (1666) versus *Iphigenia in Tauris* by Euripides (414 BCE)

Adaptation Index = 0.98

Conclusion

- Character alignment offers a language-independent method to automatically identify pairs of equivalent characters from editions of parallel plays available in DraCor.
- Depending on the number of speakers and the distance between source and target, precision scores of character alignment (in terms of correctly matched speakers and lines) range between 0.8 and 1.0.
- The Adaptation Index offers a simple but adequate quantitative indication of the distance between an adaptation and its source.
- The method of character alignment and the metric of the Adaptation Index together enable comparative studies of theatre adaptations and adaptation strategies in early modern drama.

Ecologies on Stage

DraCor Summit 2025 – 04/09/2025

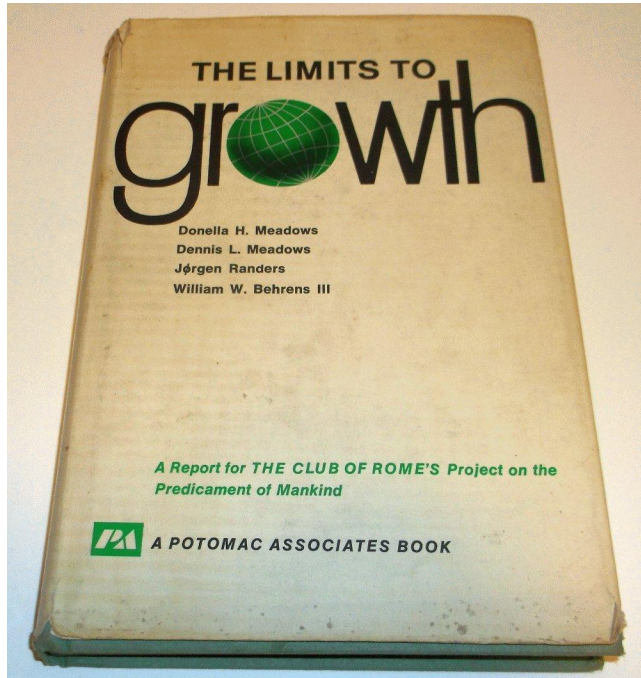
Mareike Schumacher (University of Regensburg)

Marie Flüh (University of Hamburg)

Felix Lempp (University of Bern)



Background and research interest



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by Potomac Associates page 9

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I The Nature of Exponential Growth page 25

II The Limits to Exponential Growth page 45

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IV Technology and the Limits to Growth page 129

V The State of Global Equilibrium page 156

COMMENTARY

by The Club of Rome Executive Committee page 185

APPENDIX Related Studies page 198

NOTES page 201

"... likely to be one of the most important documents of our age." ANTHONY LEWIS, in the New York Times

The message of this book is urgent and sobering: The earth's interlocking resources—the global system of nature in which we all live—probably cannot support present rates of economic and population growth much beyond the year 2100, if that long, even with advanced technology.

In the summer of 1970, an international team of researchers at the Massachusetts Institute of Technology began a study of the implications of continued worldwide growth. They examined the five basic factors that determine and, in their interactions, ultimately limit growth on this planet—population increase, agricultural production, nonrenewable resource depletion, industrial output, and pollution generation. The MIT team fed data on these five factors into a global computer model and then tested the behavior of the model under several sets of assumptions to determine alternative patterns for mankind's future. THE LIMITS TO GROWTH is the nontechnical report of their findings.

The book contains a message of hope, as well: Man can create a society in which he can live indefinitely on earth if he imposes limits on himself and his production of material goods to achieve a state of global equilibrium with population and production in carefully selected balance.

"The most important business on earth, quite literally, is the business of planetary planning. This book is a pioneering effort in that direction. It has something of value to say to anyone who understands the precarious realities of the human habitat."
NORMAN COUSINS, editor and author

"If this book doesn't blow everybody's mind who can read without moving his lips, then the earth is kaput."
ROBERT C. TOWNSEND, author of *Up the Organization* and former president and chief executive officer of Avis Rent A Car Corporation

"This book raises life-and-death questions that confront mankind as it strives for achievement of a prosperous and equitable society."
VERNON E. JORDAN, JR., executive director, National Urban League

"The Meadows and the MIT team have done a great service in constructing a preliminary model of the world in which all the assumptions and parameters are explicit and thus open to criticism and modification. Those who object to the characteristics of the model are challenged to

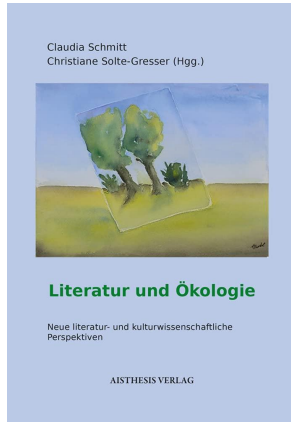
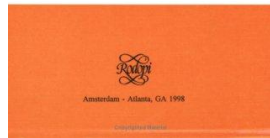
Background and research interest

- **ecocritical approaches** (Goodbody 1995; Morris-Keitel / Niedermeier 2000, Bühler 2016; Schmitt / Solte-Gresser 2017; Zemanek 2017; Detering 2020)
- **literary animals studies** (Borgards 2016)
- **plant studies** (Stobbe et al. 2022)



Literatur und Ökologie

Hg. von
Axel Goodbody



Background and research interest

- **computational environmental humanities:**

- biodiversity in literature (Langer et al. 2021, Langer et al. 2022, Piper 2022)
- agency and personification of nature (Gius und Uglanova 2023)
- sustainability studies (Schumacher et al. 2023, Schumacher and Gius 2023)

Digital Environmental Humanities
Zum Potential von „Computational and Literary Biodiversity Studies“ (CoLiBiS)

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Natur als Agens. Versuch einer computationellen Annäherung

Evelyn Gius und Inna Uglanova



1 Zu diesem Versuch

Dieser Beitrag ist ein zweifacher Versuch. Zum einen versuchen wir mit computationellen Textanalysen ökologische Bezüge in Texten der Romantik zu erfassen, indem wir die Frage verfolgen, inwiefern Natur in Texten der Romantik als Agens konzeptualisiert wird, und vier entsprechende Untersuchungen vornehmen. Zum anderen versuchen wir mit dem Beitrag ein Grundverständnis der Möglichkeiten von computergestützten Methoden in der Literaturwissenschaft zu vermitteln, indem wir die mit diesen Zugängen verbundene Herausforderung bzw. Komplexität reflektieren. Der Ansatz, Natur als Agens zu betrachten, gründet in der Annahme, dass das in der Zeit der Romantik neu entstehende ökologische bzw. proto-ökologische Bewusstsein unter anderem auf eine veränderte Wahrnehmung von Natur zurückzuführen ist.¹ Nachdem Natur bis dahin häufig als bedrohlich,

Stories of Sustainability

Mareike Schumacher¹, Evelyn Gius¹, Itay Marienberg-Milikowsky²

¹Technical University of Darmstadt, Germany; ²Ben-Gurion University of the Negev, Israel

Sustainable development as a concept of fighting against climate crisis today is very present in everyday communication as well as news discourse. In addition, the term “sustainable” is used in an almost inflationary way and mostly synonymously to “long-lasting”. In our contribution, we focus on the first ideas and precursors of sustainability in German and Hebrew literary texts. As the term “nachhaltend” which is German for “sustainable” was first mentioned in 1713 by Hanß Carl von Carlowitz in his *Sylvicultura oeconomica* Anweisung zur wilden Baum-Zucht and anchored in the very first forestry reform initiated by princess Anna Amalia of Brunswick-Wolfenbüttel in 1775 (cf. Pufé 2017, 37, Hauff 2021, 3) we take into account the closely following literary movement of German romanticism (ca. 1790-1830). In addition to the temporal proximity, this epoch is also known as being of

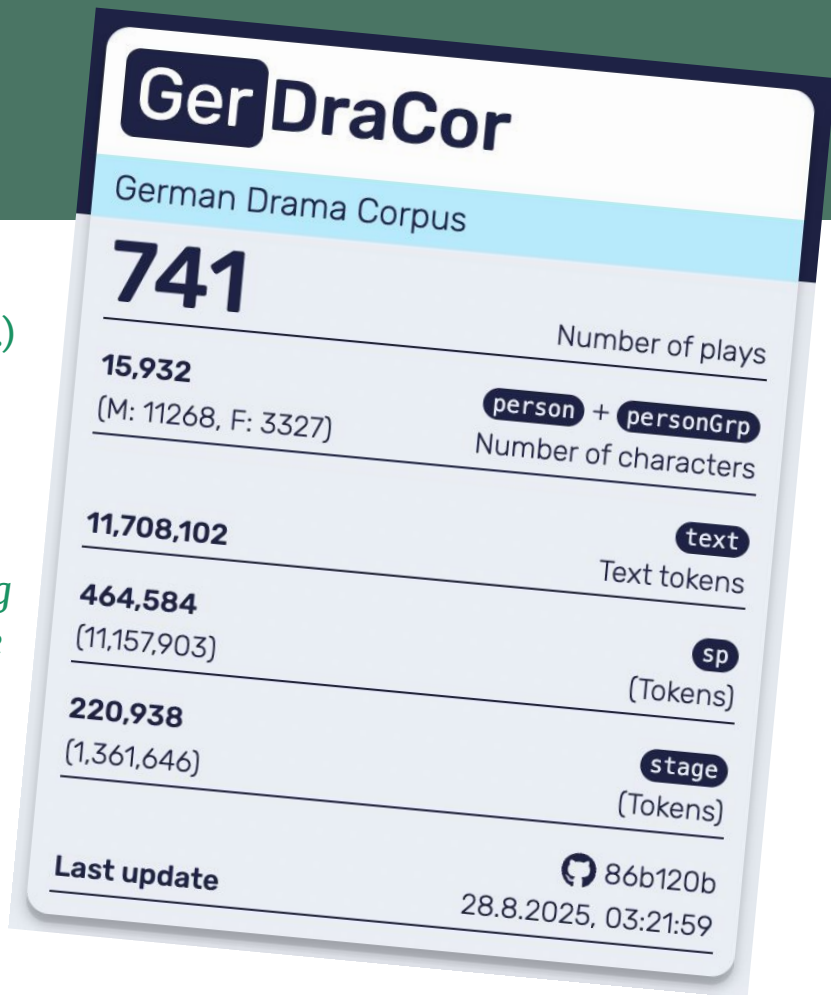
Method

- How important are ecological entities for German drama?
- Do imagined and represented dramatic sceneries differ with regard to the representation of ecological entities?
- automation-orientated annotation of 3 categories: plants, animals, and habitats
- Software: NEISS TEI Entity Enricher (Zöllner et al. 2021)
- transfer learning approach (Kamath 2019)
- implementation of pre trained GermanBERT (Chan et al. 2020)
- with fine-tuning using CRF algorithms



Corpora

- **training corpus:** 200.000 tokens
 - 30 x 150,000 tokens from EcoCor (Barkey et al.)
 - 5 x 5,000 token passages from GerDraCor
 - 5 x 5,000 token passages from travelougues
- **drama test corpus:** around 90.000 tokens
 - 1804 Schiller *Wilhelm Tell*
 - 1830 Eichendorff *Der letzte Held von Marienburg*
 - 1928 Raimund *Die unheilbringende Zauberkrone*
- **analysis corpus:** GerDraCor March 2025
 - 52 texts excluded due to technical issues
 - 680 texts used



Performance

Texts	animal	plant	habitat	Overall
Marlitt <i>Die zweite Frau</i> (1874)	0,6067	0,8242	0,8092	0,7711
Spyri <i>Heidi</i> (1880)	0,7448	0,8764	0,8506	0,8201
Raabe <i>Pfisters Mühle</i> (1884)	0,8067	0,8504	0,8561	0,8431
Löns <i>Tiergeschichten</i> (1906-1916)	0,8398	0,8789	0,8333	0,8475
Schiller <i>Wilhelm Tell</i> (1804)	0,7975	0,75	0,8761	0,8487
Eichendorff <i>Der letzte Held</i> (1830)	0,7769	0,7974	0,8909	0,8466
Raimund <i>Die Zauberkrone</i> (1928)	0,7673	0,7317	0,8529	0,7969
Mean	0,7628	0,8155	0,8527	0,8248
Median	0,7769	0,8242	0,8529	0,8431

Operationalisation or: How to measure ecologies in drama

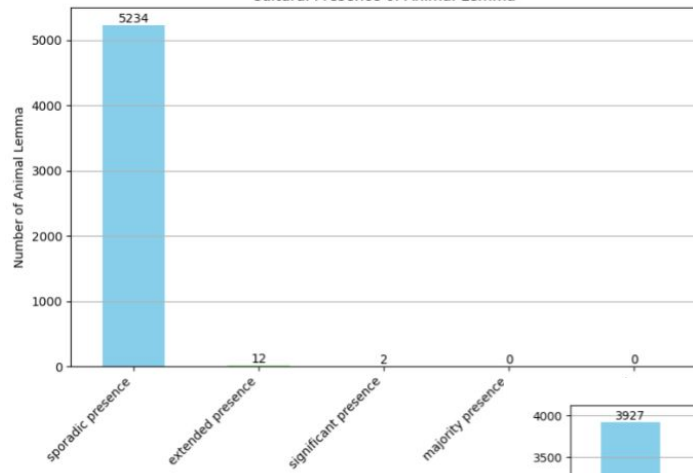
Metric	Calculation	Reference
Abundance	Number of Tokens	Langer et al. 2021: 1098
Richness	Number of Types	Langer et al. 2021: 1098
Density	Number of tokens / Number of words in text	own approach

Operationalisation or: How to measure ecologies in drama

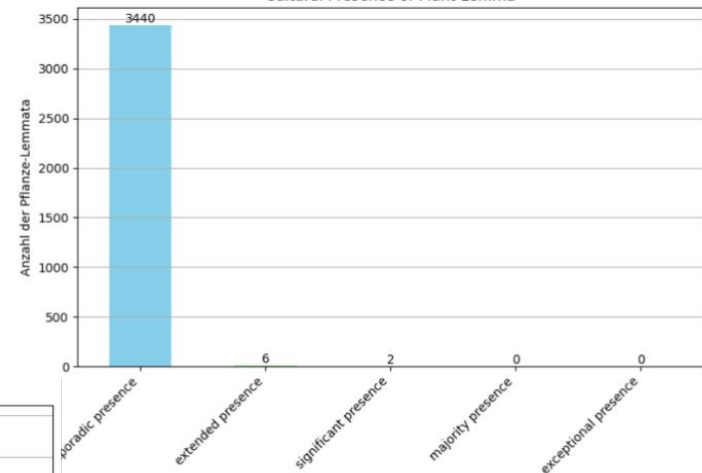
<p>Cultural presence</p>	<p>Relative parameter capturing the percentage of a given corpus an entity is mentioned in (without considering the frequency):</p> <p>sporadic presence: entity is mentioned in 0–20% of texts</p> <p>extended presence: entity is mentioned in 21–40% of texts</p> <p>significant presence: entity is mentioned in 41–60% of texts</p> <p>majority presence: entity is mentioned in 61–80% of texts</p> <p>exceptional presence: entity is mentioned in over 80% of texts</p>	<p>own approach</p>
--------------------------	--	---------------------

total number of annotations	number of texts containing total number of annotations
0–100	362
100–200	208
200–300	68
300–400	23
400–500	9
500–600	6
600–1,000	4
2,236	1

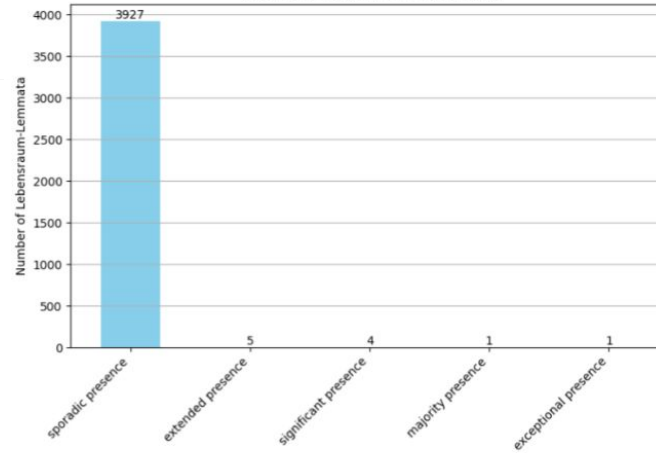
Cultural Presence of Animal-Lemma

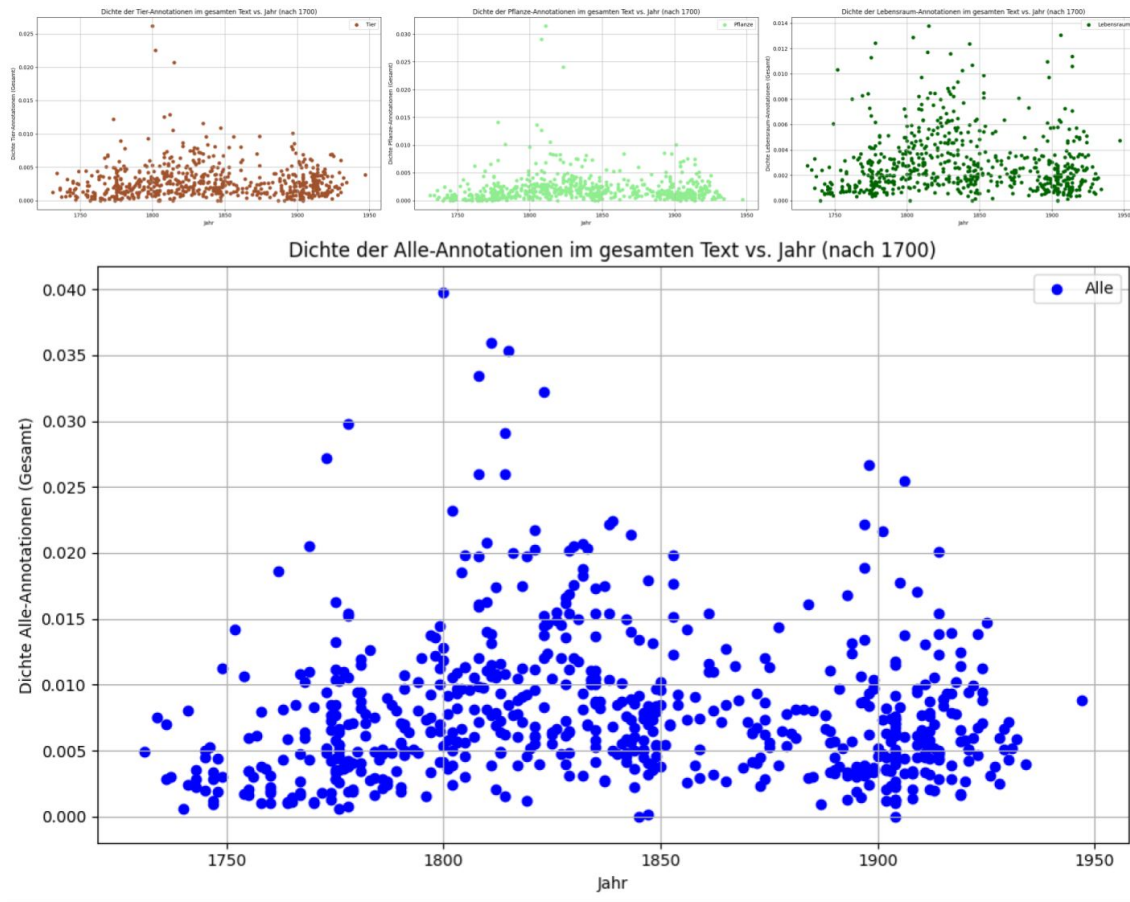


Cultural Presence of Plant-Lemma

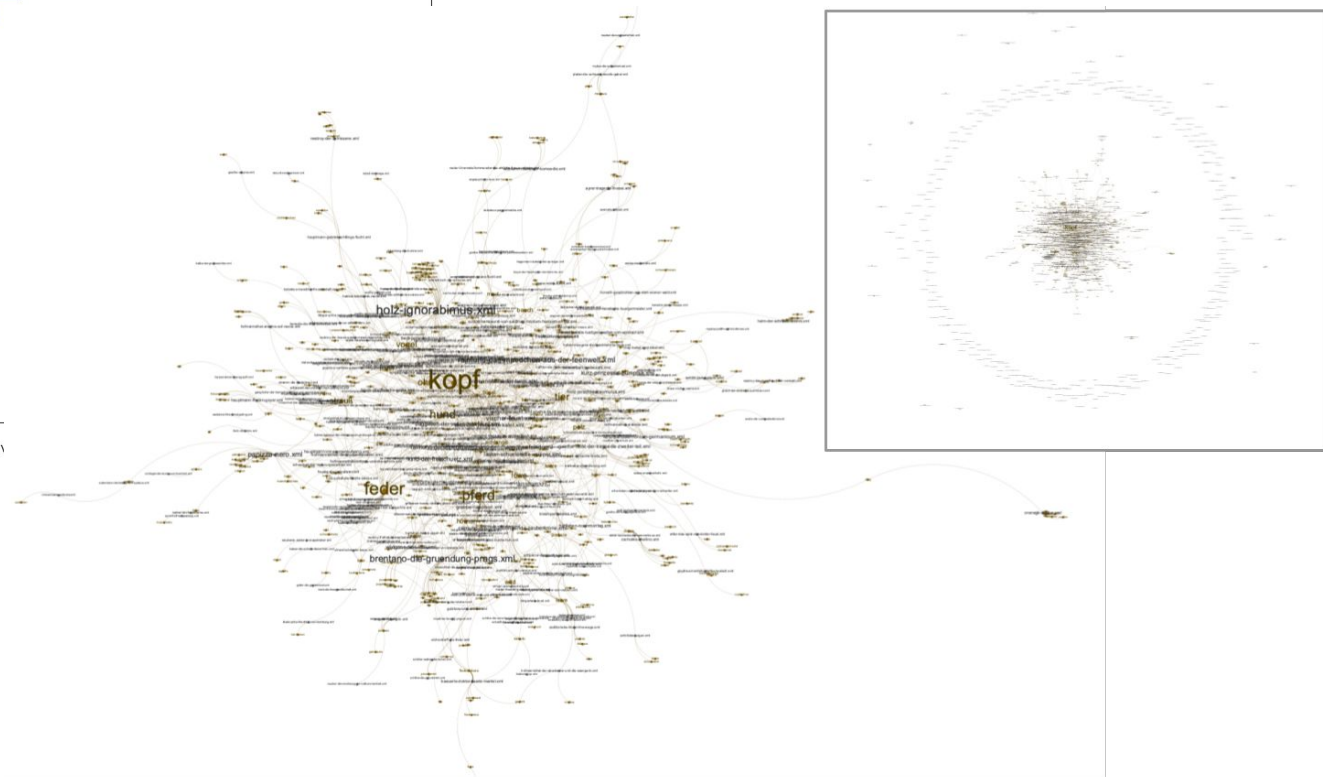
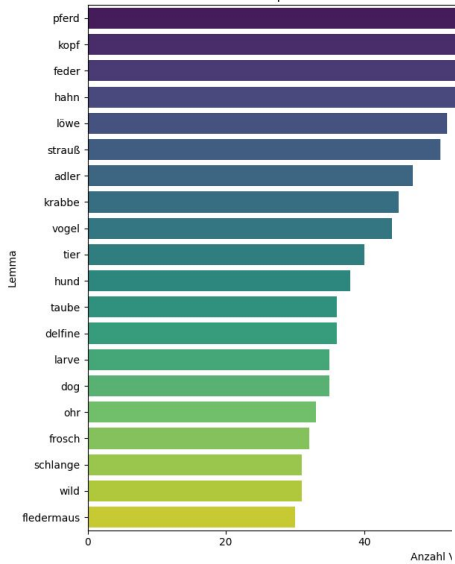


Cultural Presence of Habitat-Lemma



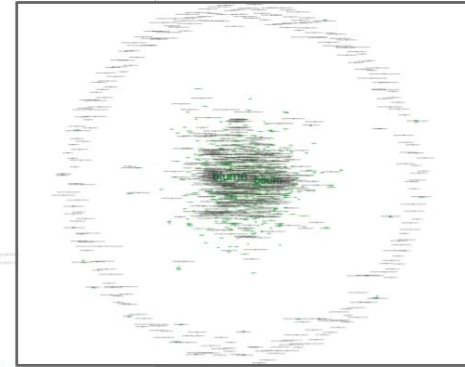
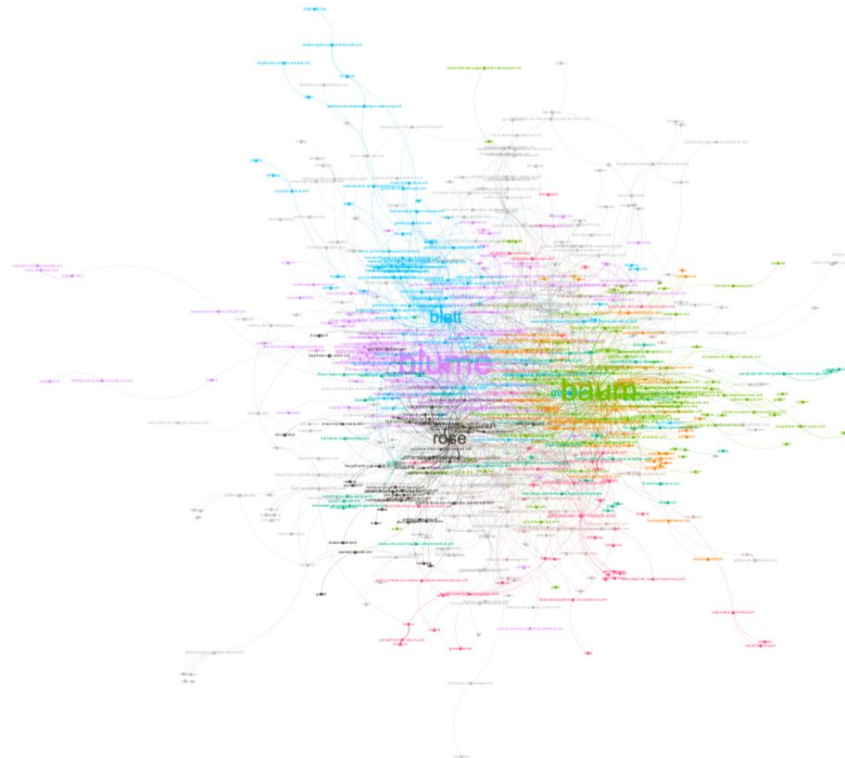
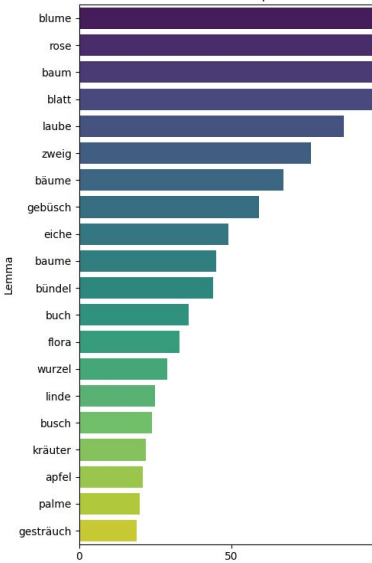


Top Lemmatisierte Tier-Annotationen in Stage Directions (Corpus Total)



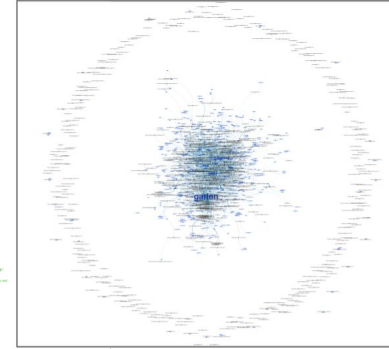
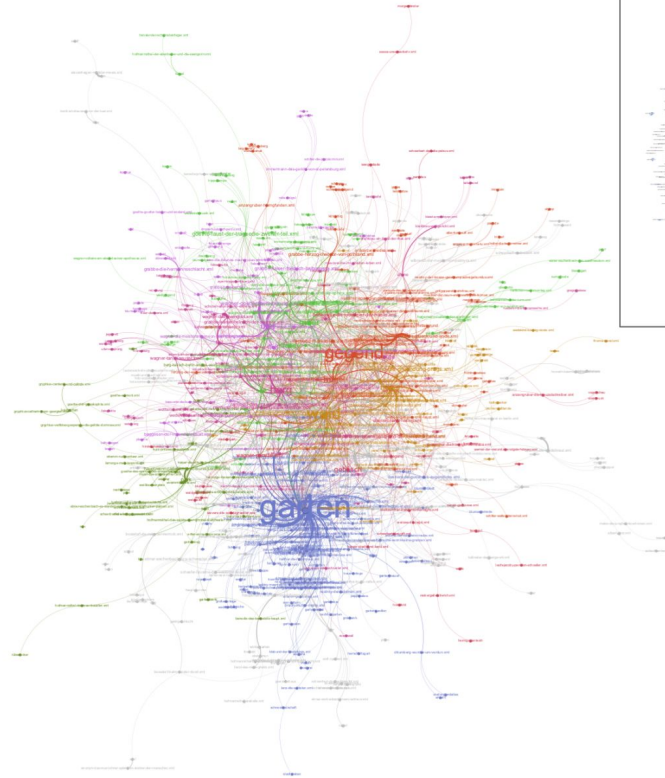
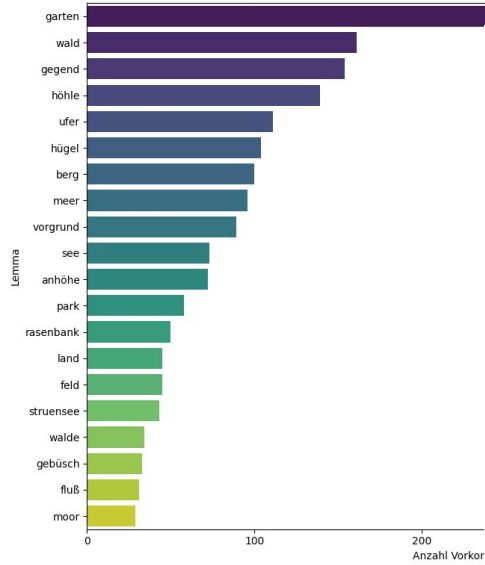
Findings II – Stage Directions (Animals)

Top Lemmatisierte Pflanzen-Annotationen in Stage Directions (Corpus Total)

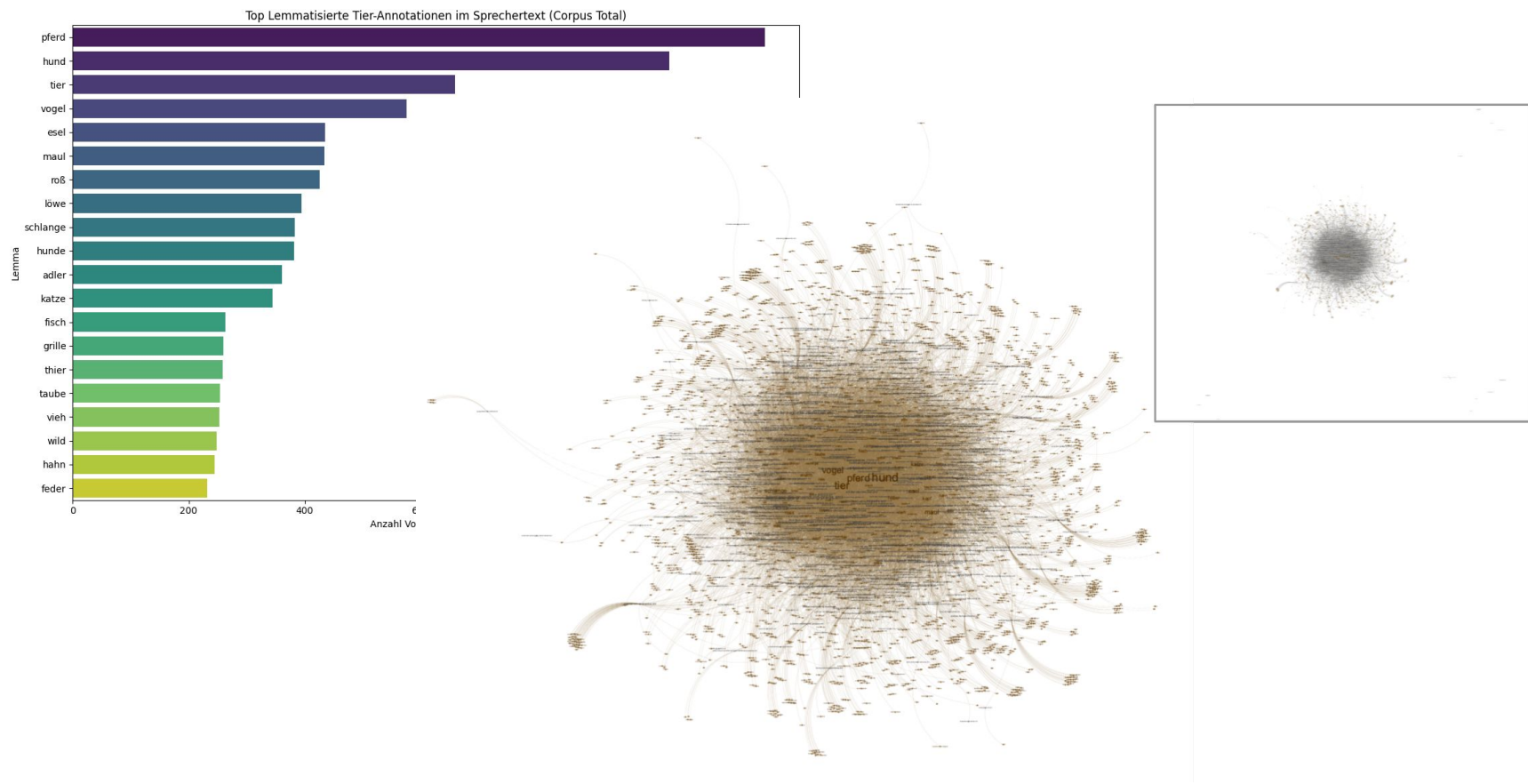


Findings II – Stage Directions (Plants)

Top Lemmatisierte Lebensraum-Annotationen in Stage Directions (Corpus Total)

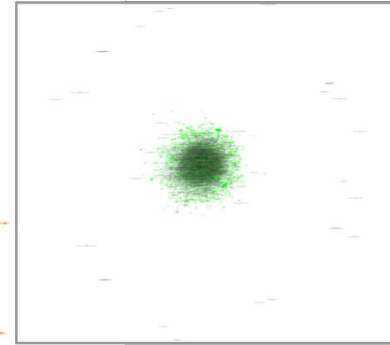
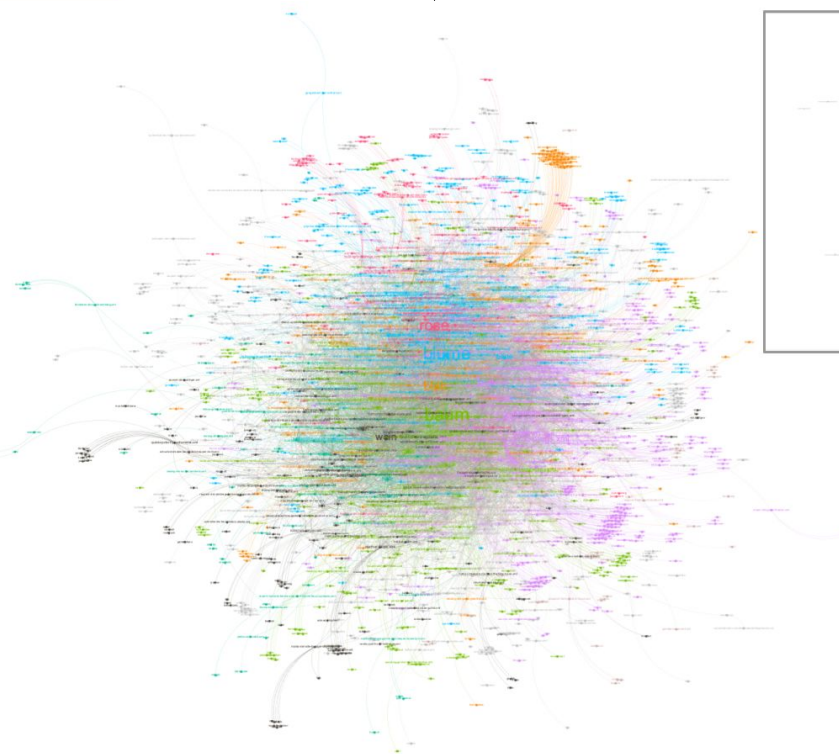
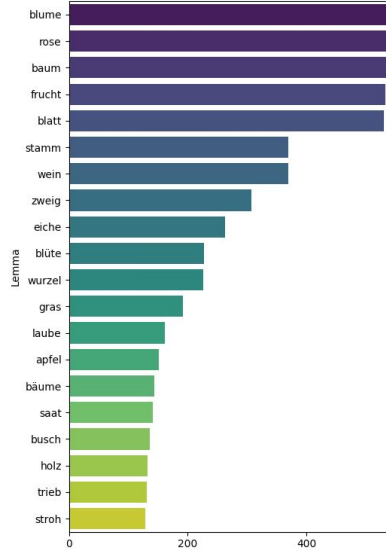


Findings II – Stage Directions (Habitats)



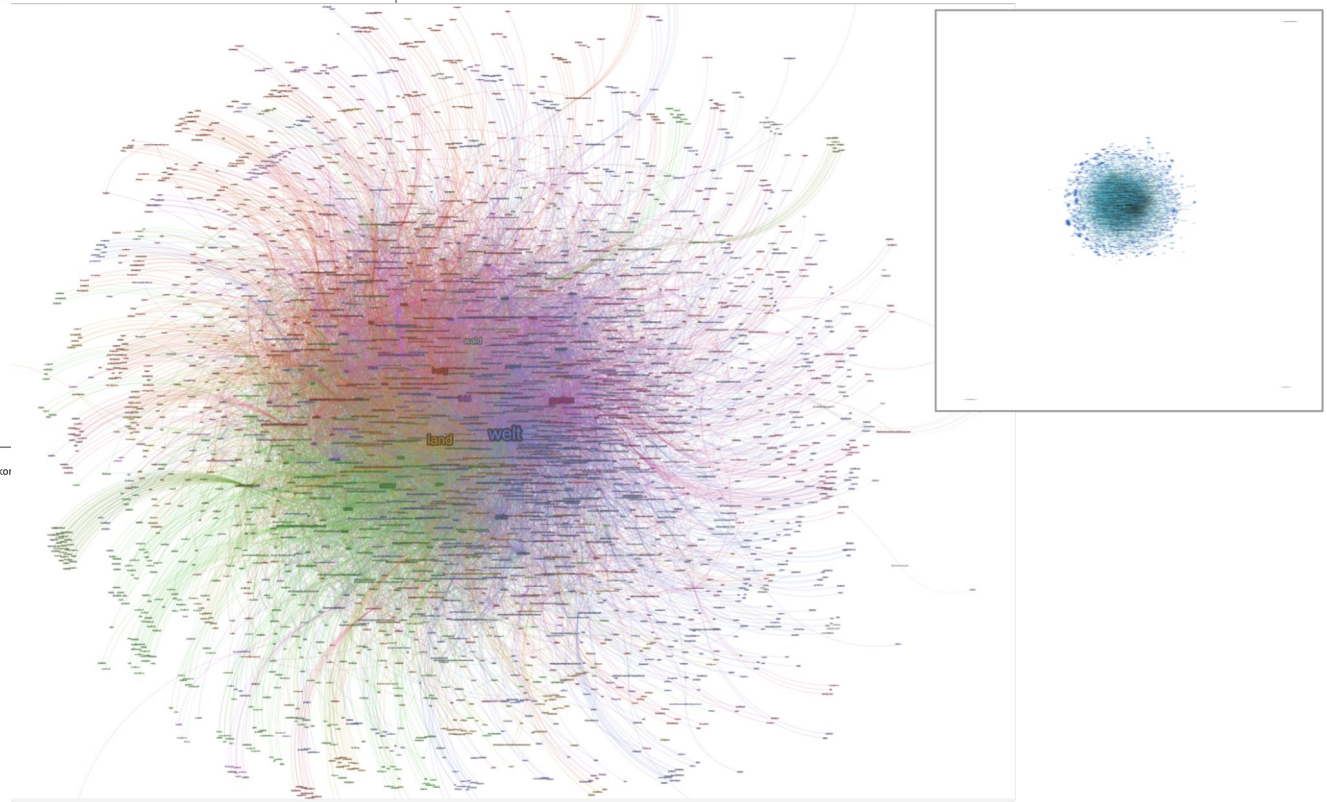
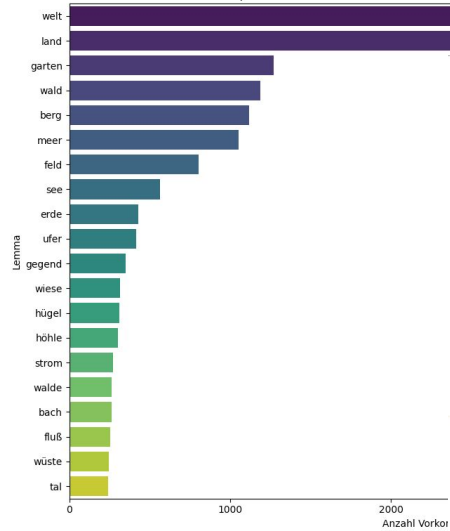
Findings III – Character speech (Animals)

Top Lemmatisierte Pflanzen-Annotationen im Sprechertext (Corpus Total)



Findings III – Character speech (Plants)

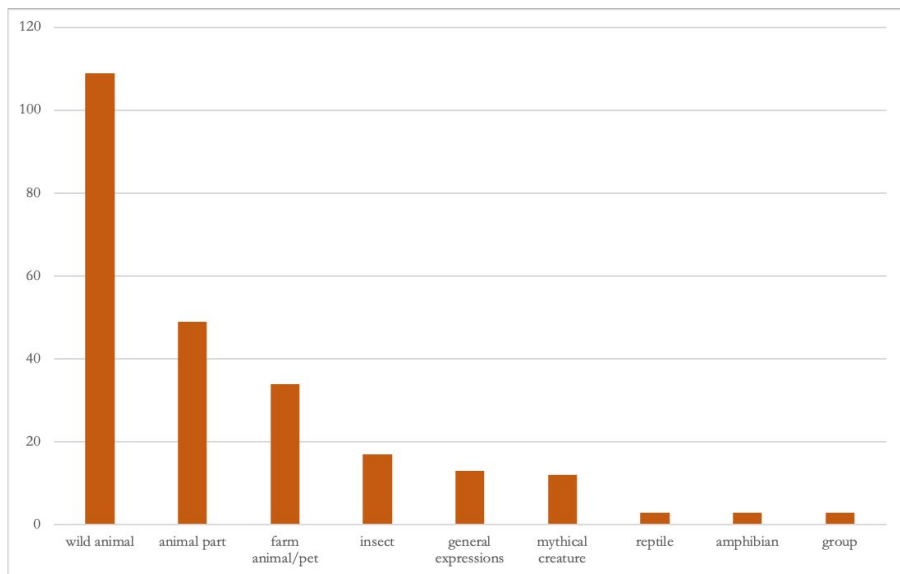
Top Lemmatisierte Lebensraum-Annotationen im Sprechertext (Corpus Total)



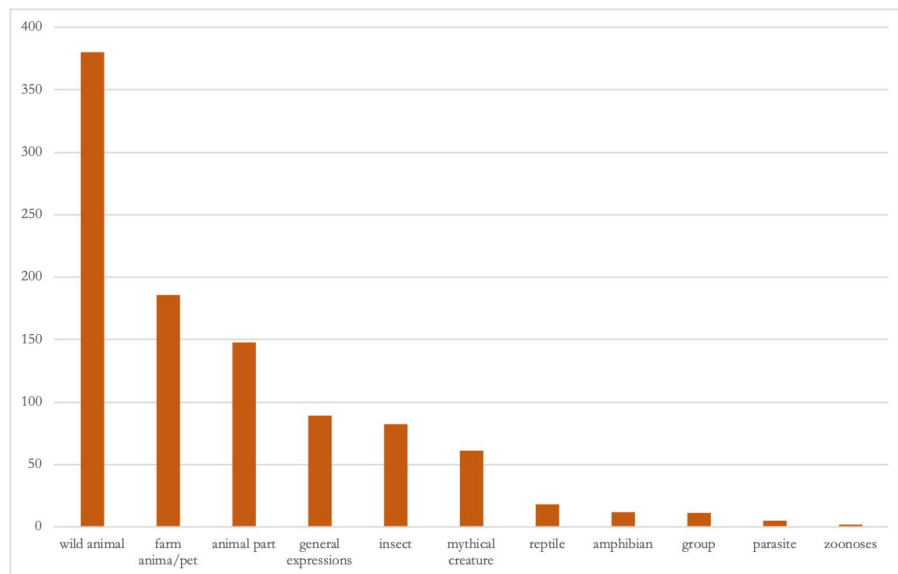
Findings III – Character speech (Animals)

Findings IV – Domesticated and wild animals

Stage

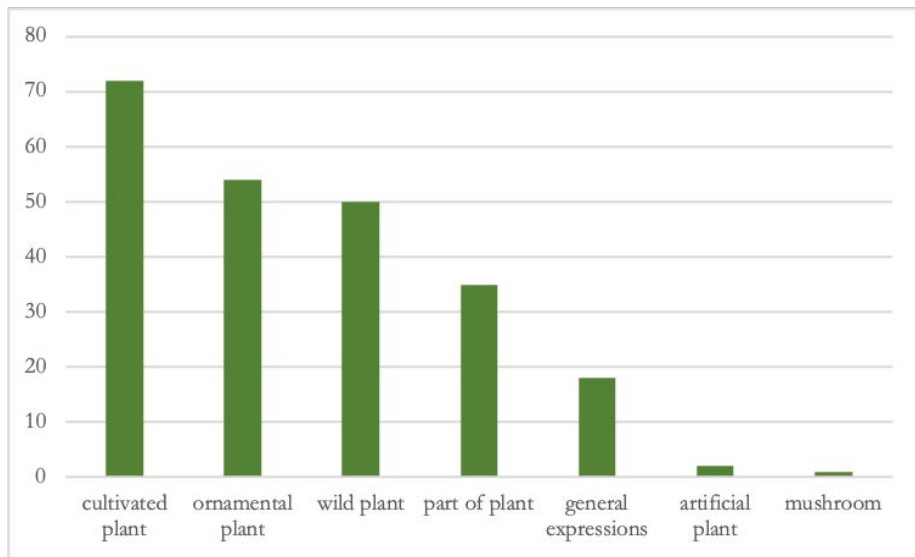


Character Speech

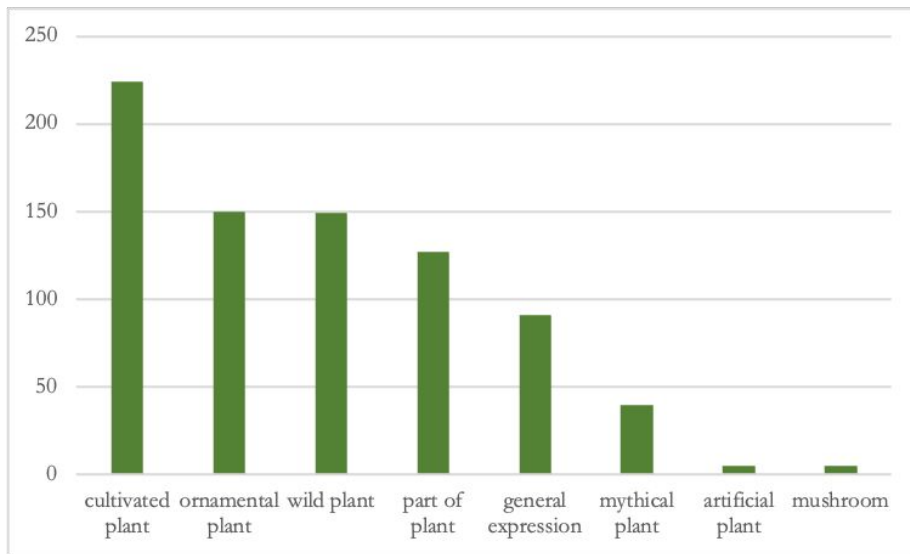


Findings IV – Domesticated and wild plants

Stage



Character Speech



Conclusions

- Most GerDraCor-texts feature **rare numbers of ecological entities**
- Most ecological entities are **sporadically present** in German drama
- There are **two waves** of higher ecological density in drama: One around 1800 and one around 1900
- Most **stage directions don't feature ecological entities**
 - Stage directions feature mostly animals parts, dogs and horses
 - Stage directions mostly feature flowers and other decorative plants
 - Stage directions build habitat-clusters and thus groups of garden-plays, shore-plays, forest-plays and so on
- Most **character speeches feature ecological entities**
 - some plays prefer common animals like dogs, horses or birds, some bring diversity by mentioning rare animal entities
 - Most common plant entities in character speech resemble most common plant entities in stage directions
 - Most common habitat entities in character speech refer to larger habitat (world, land,...)
- **Wild animals** are more common in both stage directions and character speech
- **Cultivated and decorative plants** are more common in both stage directions and character speech

Thank you
for listening!



*the grasshopper is occurring in the speaker text of 16 GerDraCor plays

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Annotating Digital Traces of Performance: Methods and Approaches

Mike Kelly, Claire Kenward, Giovanna Di Martino,
Pantelis Michelakis

DraCor Summit 2025



APGRD, University of Oxford, Faculty of Classics
Archive of Performances of Greek & Roman Drama

‘Exploring Digital Futures’ – 11-month scoping project

1. What aspects of performance - visual, auditory, spatial, temporal, or embodied – can be systematically encoded and compared in ways that reveal interpretive patterns within and across performances?
2. By focussing on performance, what new perspectives can be opened up on the notion of the dramatic text?

Methodology

- ‘Data-assisted’ approach: data and its manipulation serve to inform debate, provide new perspectives, and prompt a mode of defamiliarisation from the objects of study
- Emphasis on intermediality of performance media

[↗](#) Varela, M. E. (2021). *Theater as Data: Computational Journeys into Theater Research*, Ann Arbor, MI: University of Michigan Press

Custom TEI Schema

- Layers of performance
 - **Stage Layer:** spatial architecture -- proscenium, thrust, site-specific, etc.
 - **Lighting Layer:** modulation through blackouts, washes, spotlights, etc.
 - **Audio Layer:** duration, volume, and re/mediation of verbal language, environmental noise, etc
 - **Bodies Layer:** expression, vocal address, stage level, etc.
 - **Set Layer:** incl. form, texture, space, and cultural reference
 - **Object Layer:** props whose function becomes narratively or symbolically charged

Custom TEI Schema

- Textual layers
 - performance transcript
 - script on which performance is based
 - translations and modern editions
mediating between performance script
and ancient play
- Cumulative signification across layers

Interoperability, meet copyright

Collaborative relationships with a select
number of copyright-holding partners

Multimodal Presentation of Research Outputs

- The highly mediated nature of the material, and the emphasis on reception studies, influence the presentational mode of research outputs
- Collaborative, interpretative commentary and multilingual reception histories are set alongside data formatted in standardised structures.



Preview

[Transcription 8 \(Magnet-Antigone-Wide.json\)](#)

Scroll Sync On

Show audio amplitude per word

Transcript

Ismene: I am living. 34.0s (00:00:34) [eye icon] [edit icon]
SPEAKER_08
ID: 3424 | Timeline: ✓ (34.019s) | Words: 3

Ismene: You are listening. 35.3s (00:00:35) [eye icon] [edit icon]
SPEAKER_08
ID: 3425 | Timeline: ✓ (35.260s) | Words: 3

Ismene: I am here. 36.4s (00:00:36) [eye icon] [edit icon]
SPEAKER_08
ID: 3426 | Timeline: ✓ (36.401s) | Words: 3

XMLScriptsTranslationsAnnotationsMedia

I am living.
</u>

<u who="#speaker_08" start="35.26" end="36.221">
You are listening.
</u>

<u who="#speaker_08" start="36.401" end="37.362">
I am here.
</u>

Multimodal Presentation
Prototype interface, showing diverse
source materials



Transcription 8 (Magnet-Antigone-Wide.json)

XML

Scripts

Translations

Annotations



Media

I am living.


Transcript

Ismene: I am living. 34.0s (00:00:34)

SPEAKER_08

Ismene: You are listening. 35.3s (00:00:35)  

SPEAKER_08

Ismene: I am here. 36.4s (00:00:36)  

SPEAKER_08

XML

Scripts

Translations

Annotations

Media

I am living.

</u>

<u who="#speaker_08" start="35.26" end="36.221">

You are listening.

<u who="#speaker_08" start="36.401" end="37.362">

I am here.

Multimodal Presentation

Prototype interface, showing diverse source materials

Methods and Tools

WhisperX automatic speech recognition

- Speaker diarization
- Word-level timestamps
- Multilinguality

 <https://github.com/m-bain/whisperX>

Transcription





Edit Transcription Text

[Transcription 8 \(Magnet-Antigone-Wide.json\)](#)

- Scroll Sync On
- Show XML
- Export XML

ID: 3565 | Timeline: ✓ (868.797s) | Words: 4

Ismene: The rivers have run dry in the valley and beyond, and we are rationed. 870.2s (00:14:30)  

SPEAKER_08

ID: 3566 | Timeline: ✓ (870.218s) | Words: 14

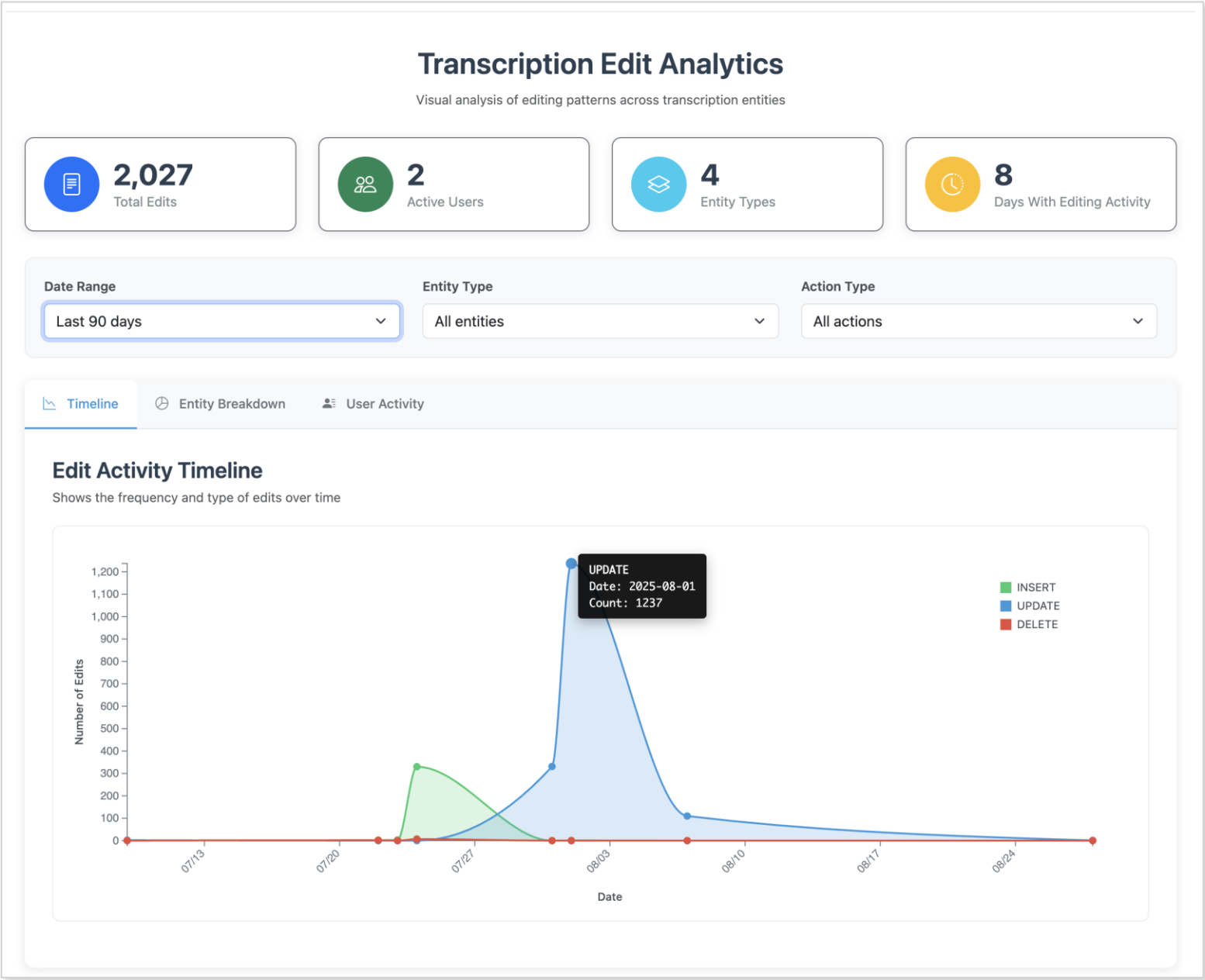
Ismene: Level 75. 886.2s (00:14:46)  

SPEAKER_08

ID: 3567 | Timeline: ✓ (886.169s) | Words: 2

Methods and Tools

Editing of transcription with
synchronised video



Methods and Tools

Audit table analysis of human corrections to WhisperX outputs

Related Transcription Words

Filter

Filter words by confidence score

Show words with confidence \leq this value:

0.606

0.000 (lowest)1.000 (highest)

Apply FilterReset

Showing 6 words with confidence \leq 0.606

Id	Segment Id	Start	End	Word	Character	Speaker	Person	RMS Amp	Confidence	Actions		
67	2452	174.785	174.965	with	Tiresias	SPEAKER_04		0.036	0.478	View	Edit	Delete
68	2452	175.025	175.745	re-found	Tiresias	SPEAKER_04		0.081	0.435	View	Edit	Delete
74	2452	178.826	179.166	new	Tiresias	SPEAKER_04		0.063	0.596	View	Edit	Delete
75	2452	179.246	179.746	leader,	Tiresias	SPEAKER_04		0.019	0.591	View	Edit	Delete
79	2452	182.907	183.007	the	Tiresias	SPEAKER_04		0.021	0.388	View	Edit	Delete

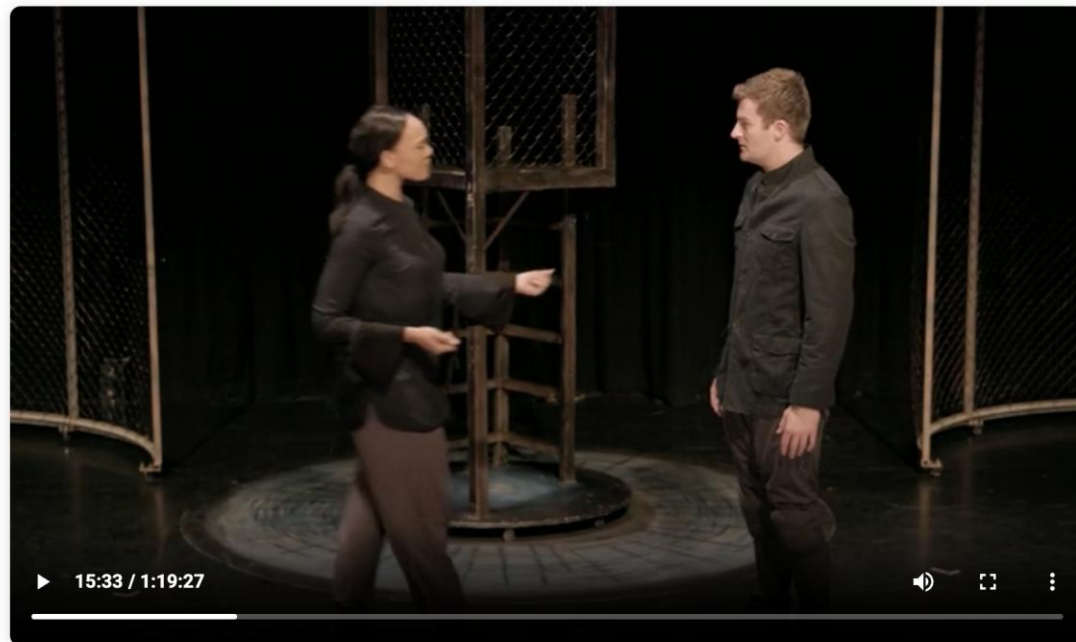
Methods and Tools

Human evaluation and correction of WhisperX transcription

Preview of [Transcription 7 \(17924.json\)](#)

Scroll Sync On

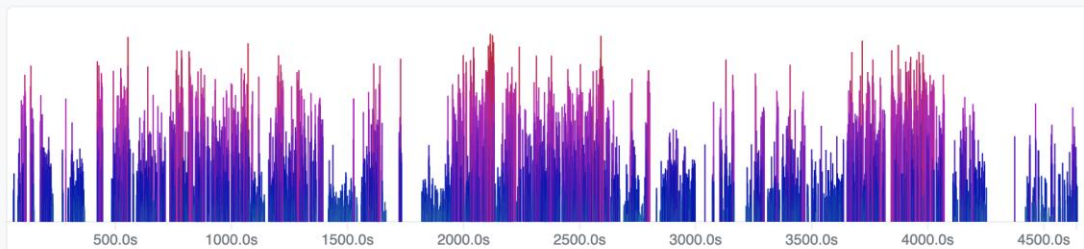
Hide XML



Hide audio amplitude per word

Timeline Zoom: 1.0x Quick zoom: 1x 5x 10x 25x 50x

6207/6207 words visible | Duration: 4630.4s | Amplitude range: 0.001 - 0.156



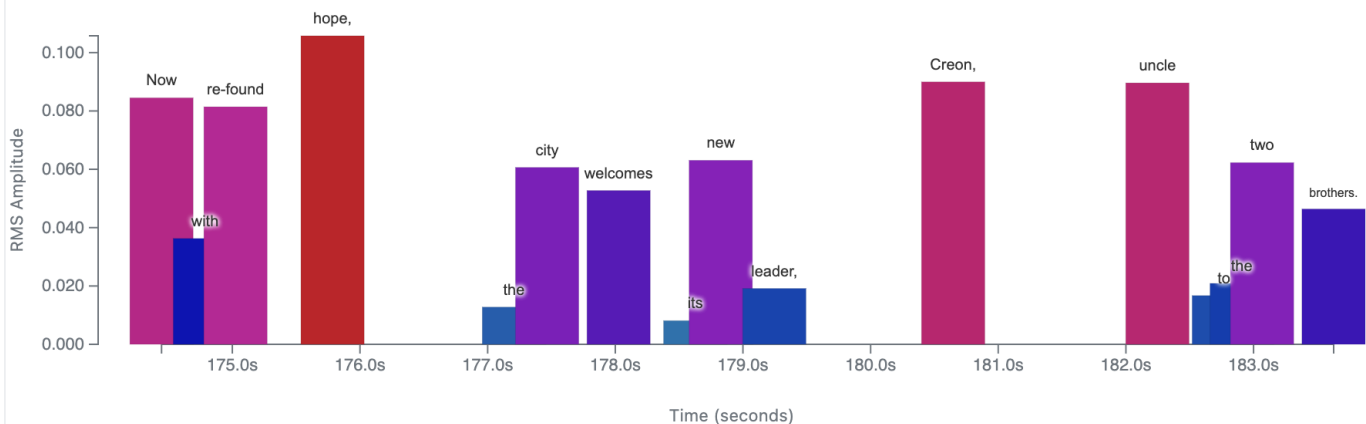
Methods and Tools

Audio analysis

Amplitude per word – overview

Audio Amplitude

16 words | Duration: 9.7s | Speaker: SPEAKER_04



Related Transcription Words

Filter

Id	Segment Id	Start	End	Word	Character	Speaker	Person	RMS Amp	Confidence	Actions		
66	2452	174.445	174.765	Now	Tiresias	SPEAKER_04		0.085	0.73	<button>View</button>	<button>Edit</button>	<button>Delete</button>
67	2452	174.785	174.965	with	Tiresias	SPEAKER_04		0.036	0.478	<button>View</button>	<button>Edit</button>	<button>Delete</button>
68	2452	175.025	175.745	re-found	Tiresias	SPEAKER_04		0.081	0.435	<button>View</button>	<button>Edit</button>	<button>Delete</button>
69	2452	175.785	176.125	hope,	Tiresias	SPEAKER_04		0.106	0.712	<button>View</button>	<button>Edit</button>	<button>Delete</button>
70	2452	177.206	177.326	the	Tiresias	SPEAKER_04		0.013	0.791	<button>View</button>	<button>Edit</button>	<button>Delete</button>

Methods and Tools

Audio analysis

Amplitude per word – segment

Methods and Tools

- WISE

 <https://www.robots.ox.ac.uk/~vgg/software/wise/>

- Visual Geometry Group (VGG) – other tools

 <https://www.robots.ox.ac.uk/~vgg/software/>



Case Study 1

ReTAGS *Antigone* (*not quite/quiet*)
(South Africa, 2019,
dir. Mark Fleishman, Jennie Reznek,
Mandisa Vundla, and SEK Mqhayi)

- Comprehensive audiovisual documentation of rehearsals
- Multilingual (English; IsiXhosa; Zulu; Afrikaans and Southern Sotho)
- Performers' lived experience of 'our postcolonial present'
(<https://ibali.uct.ac.za/s/RETAGS/page/home>)



Case Study 2

Actors of Dionysus' *Antigone*
(UK, 2017, dir. Tamsin Sasha,
playwright Christopher Adams)

- Multiple source texts, including various script drafts, references, translations, adaptations
- Innovative use of chorus
- Elaborate sound design

Conclusion

- Additional layers of TEI encoding required for video recordings of drama performances
- Intermedial nature of material prompts sharing of rich context in presentation of research outputs
- Data analysis for re-presentation of aspects of performance triggers conceptual shifts in their reading

Thank You

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DraCor Summit 2025: Workshop on Computational Drama Analysis

Sentiment Analysis of RusDraCor with BERT-Based Models: Exploring Emotional Tendencies of Russian Drama and Method Limitations

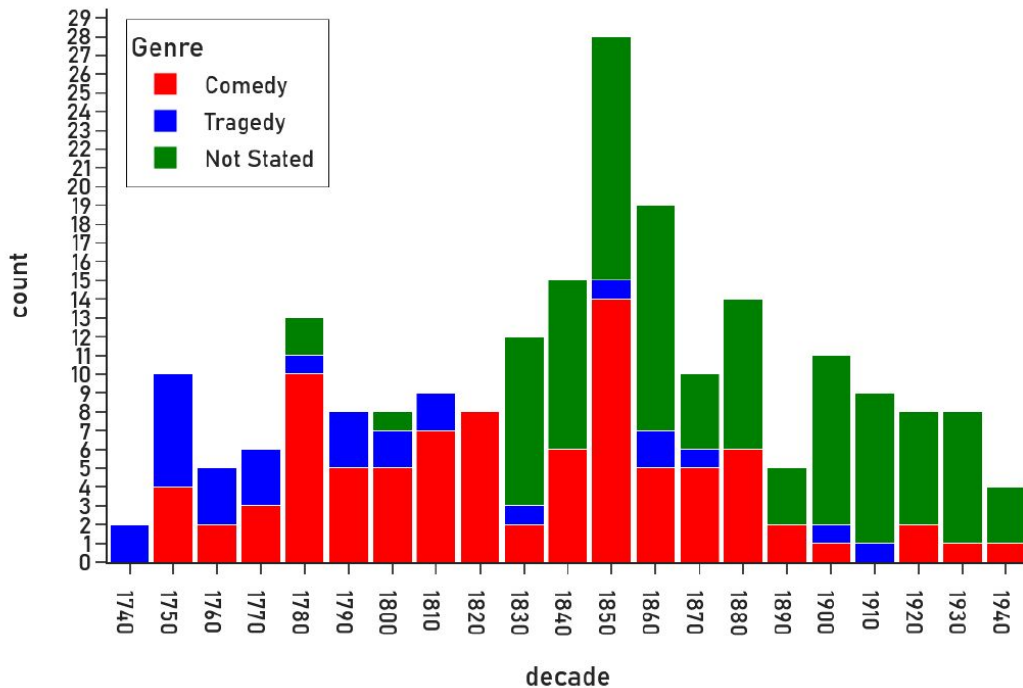
Ksenia Anisimova

Key premises & statements

- 1) **Sentiment analysis of Russian literary texts is rather an unsolved task. Although, transfer learning via BERT is not yet widely applied.**
- 2) **We have to establish whether transfer learning via BERT is applicable for Russian SA**

Result: It is possible to describe emotional tendencies of Russian drama via transfer learning with BERT

DraCor Russian Drama Corpus



- 212 plays;
- 1740-1940;
- More comedies than tragedies;
- The biggest number of plays written by Ostrovsky

Preliminary evaluation of selected BERT models

Model name	Model Source	# of labels	w-F1*	w-F1* (plays)
XLM-RoBERTa-Large	Smetanin, S., & Komarov, M. (2021). Deep transfer learning baselines for sentiment analysis in Russian, (HuggingFace)	5	78,31	0,73
RuBERT-Base-Cased-Conversational	DeepPavlov (fine-tuned to sentiment analysis)	3	(0,77)?	0,62

*weighted f1-score

Manual markup

- Only 10 plays (5% of the total number of plays in the entire corpus).
- One play for each two decades.
- Plays features roughly correspond to the initial corpus feature distribution.
- The authors are not repeated

Spoken Line	Sentiment	Play	Author	Year
Дед ваш Гостомысл скончался.	NEGATIVE	From the life of Rurik	Catherine II	1786
Я думал лишь о ней, когда поехал с балу.	POSITIVE	Trip to Kronshtadt	Pisarev	1823
Та когда мне кумом-то был? Когда у меня капиталу не было.	NEUTRAL	The Hot Heart	Ostrovsky	1869
Господи, помилуй!	SKIP	Tatiana Repina	Checkov	1889
Простите нас, сударь!	SPEECH	Lesson to the Daughters	Krylov	1807

Выборка пьес для экспертной разметки

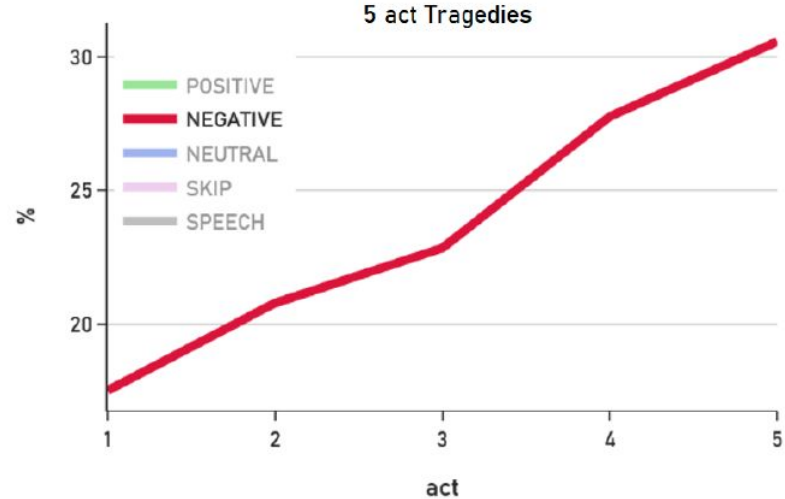
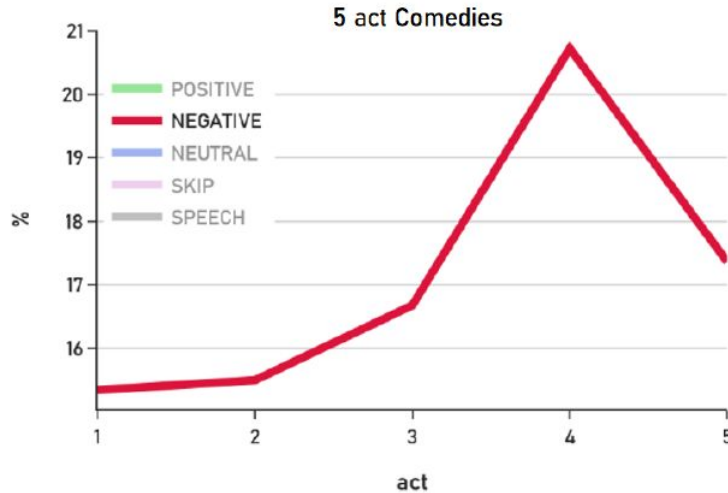
Название пьесы	Автор	Год
Гамлет	Сумароков	1748
Корион	Фонвизин	1764
Из жизни Рюрика	Екатерина II	1786
Урок дочкам	Крылов	1807
Поездка в Кронштадт	Писарев	1823
Шила в мешке не утаишь — девушки под замком не удержишь	Некрасов	1841
Горячее сердце	Островский	1869
Татьяна Репина	Чехов	1889
Балаганчик	Блок	1906
Противогазы	Третьяков	1924

Emotional Tendencies: genre

Genre/ Sentiment (%)	NEUTRAL	NEGATIVE	SKIP	POSITIVE	SPEECH
Comedy	58,6	17,7	15,9	6,4	1,4
Tragedy	39,9	23,9	32,3	3,4	0,46
Not Stated	57,9	19,3	14,9	6,4	1,5

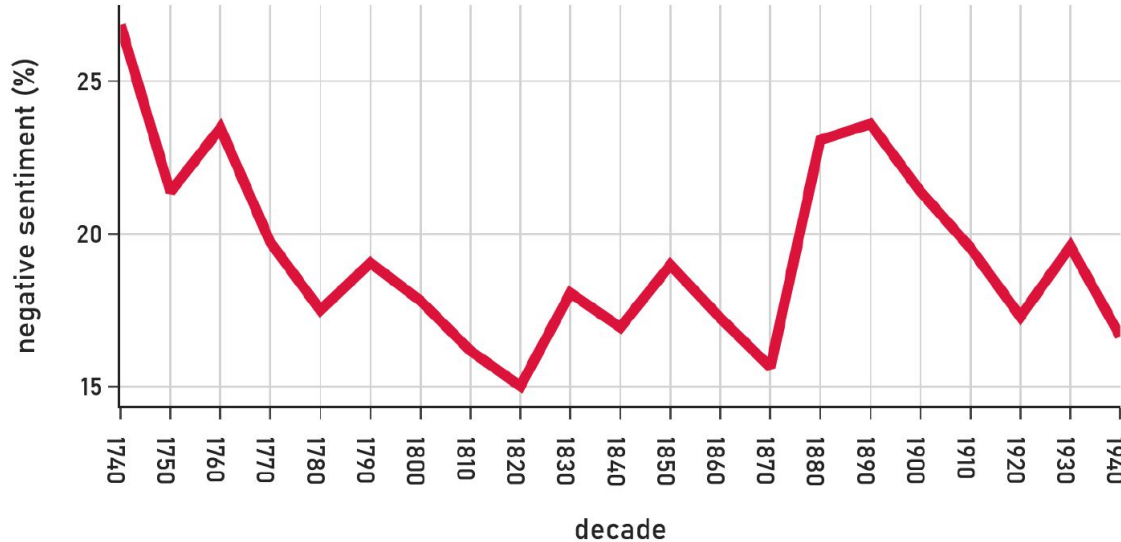
- Tragedies have more negative lines, while comedies have more positive ones – a **genre indicator**?

Negative sentiment as reflection of dramatic composition



*corresponding dynamics are found in 3-act comedies and tragedies

Emotional Tendencies: time



- **Less than average**
Comedies of the 1810s-1820s;
Ostrovsky: 1870s.
- **More than the average:**
Tragedies: 1740s, 1760s;
Chekhov: 1880s, 1890s (also peaking in positive dynamics).

Close and open dramatic structures (P. Bogdanova)

The emotional dynamics of drama probably reflect dramatic structural transformations — from classicism to modernist drama, from closed structures to open ones, and from external to internal conflict.

- ★ Mid-18th century — the emergence of drama as a genre in Russia, classical tragedies, negativity prevails.
- ★ Beginning of the 19th century — classicist comedies. Transition to sentimentalism. Negativity is low.
- ★ Ostrovsky — Russian drama as an independent genre. Classical structure and conflict directed outward. Negativity is low.
- ★ Chekhov — a new model of drama. Open structure and internal conflict direction. Negativity and positivity are high. Modernism.

Thank you!



What Does Drama Sound Like?

Sound Analysis of GerDraCor at DraCor Summit 2025

FU Berlin, 03.09.2025

Janis Pagel, Svenja Guhr, Nils Reiter

Fictional Soundscapes (Guhr 2025)

“[T]he ensemble of sounds represented in a literary text that provides information about (1) the acoustic setting of the fictional world with focus on (2) the sounds produced by the characters and their ambiance in the course of the fiction.”

Character Sounds and Ambient Sounds

Ex. 14 <sp who=“laszlo”> <speaker>Laszlo.</speaker>

<p>... jagt ... <ambient_sound>und ratter</ambient_sound> ... <ambient_sound>und knatter</ambient_sound> und wirbelt ... <stage><character_sound>Lacht auf</character_sound> und wirft die Pfeife in die Ecke.</stage></p> </sp> (*Die Haidebraut*, Stramm)

Sound Analysis of German Plays

4 types of sound indications found in GerDraCor:

Ex. 1 “Darum ich euch sehr fleißig **bitt**”

“I kindly **request** that you do so”. (*Eulenspiegel*, Sachs)

Ex. 2 “Wie du jetzt selber hast **gered’t**”

“As you have **stated** yourself”. (*Eulenspiegel*, Sachs)

Ex. 3 “<stage>Man hört noch einen **Schuß**.</stage>”

“<stage>Another **shot** is heard</stage>”. (*Die Räuber*, Schiller)

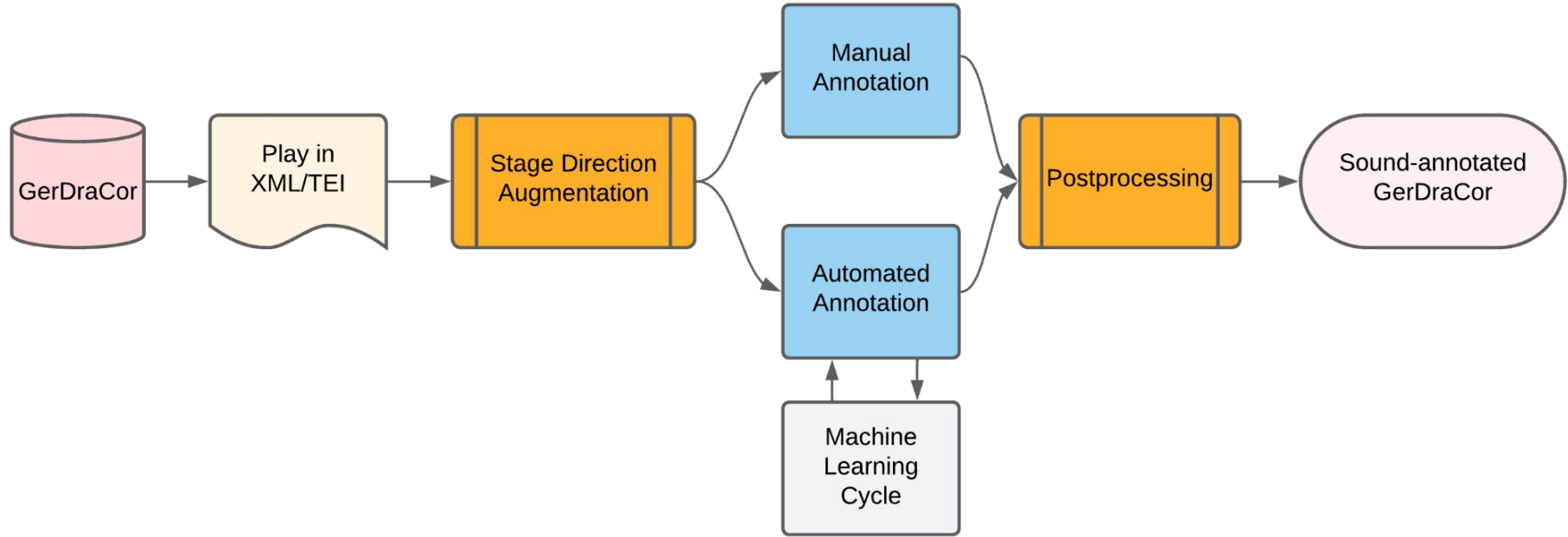
Ex. 4 “ORSINA <stage>**heftig**.</stage> Nicht gelesen?”

“ORSINA <stage>**fiercely**</stage> Didn’t read?”. (*Emilia Galotti*, Lessing)

Research Questions

- 1) How does sound in drama compare to sound in prose?
- 2) How can detecting sound be operationalized in dramatic texts?
- 3) How is sound used in plays across different (sub-)genres and centuries?

Method



Augmentation of the Stage Directions

Ex. 5 <sp who="nathanael_jettel"> <speaker>Nathanael Jettel,</speaker>
<stage>sehr ruhig.</stage><p>Könnten Sie mir nicht sagen, Direktor, wer Ihnen in Gottes Namen auf die Krawatte
getreten hat?</p> </sp> (*Die Ratten*, Hauptmann)

Ex. 6 <sp who="nathanael_jettel"> <speaker>Nathanael Jettel,</speaker>
<stage>**sagt** sehr ruhig.</stage> <p>Könnten Sie mir nicht sagen, Direktor, wer Ihnen in Gottes Namen auf die
Krawatte getreten hat?</p> </sp> (*Die Ratten*, Hauptmann)

Training Set for Finetuning German BERT (Chan et al. 2020)

	Author (Publication Year)	Title
Training Set	Ayrer (1605)	<i>Fassnachtspiel – Wie einem Weib jhr eygener Mann</i>
	Neuber (1736)	<i>Die beschützte Schauspielkunst</i>
	Lessing (1772)	<i>Emilia Galotti</i>
	Schiller (1781)	<i>Die Räuber</i>
	Günderode (1805)	<i>Udohla</i>
	Chezy (1823)	<i>Der neue Narziss</i>
	Ebner-Eschenbach (1862)	<i>Die Veilchen</i>
	Dohm (1878)	<i>Ein Schuß in's Schwarze</i>
	Dovsky (1915)	<i>Mona Lisa</i>
	Borchert (1947)	<i>Draußen vor der Tür</i>
Test Set	Sachs (1557)	<i>Eulenspiegel mit dem blauen Hosentuch</i>
	Wedekind (1891)	<i>Frühlings Erwachen</i>

Table 1

Set of 12 manually annotated plays distributed to separate training and test sets.

Automated Sound Annotation - 5 Experiments

TEI-enriching NEISS NTEE software (by Lemke, Sperfeld, Zöllner)

Training set	65 prose	65 prose + 5 drama	5 prose + 5 drama	5 drama	10 drama
Tokens	736,970	835,750	237,686	98,780	151,314
Sound events	10,763	11,876	2,896	1,113	1,761
SequEval-F1 ⁴	0.01 / 0.15	0.20 / 0.20	0.01 / 0.23	0.00 / 0.33	0.43 / 0.53
Precision	0.10 / 0.23	0.39 / 0.29	0.07 / 0.32	0.04 / 0.37	0.36 / 0.54
Recall	0.07 / 0.32	0.26 / 0.34	0.07 / 0.36	0.04 / 0.46	0.61 / 0.52
F1-Score	0.09 / 0.27	0.31 / 0.32	0.07 / 0.34	0.04 / 0.41	0.45 / 0.53
E-F1-Score	0.02 / 0.24	0.21 / 0.28	0.02 / 0.39	0.00 / 0.48	0.54 / 0.60

Table 3

Evaluation scores on the test texts: 1) Sachs' *Eulenspiegel* and 2) Wedekind's *Frühlings Erwachen*. The first evaluation score is always Sachs, the second Wedekind.

What Can We Do with Sound Annotations?

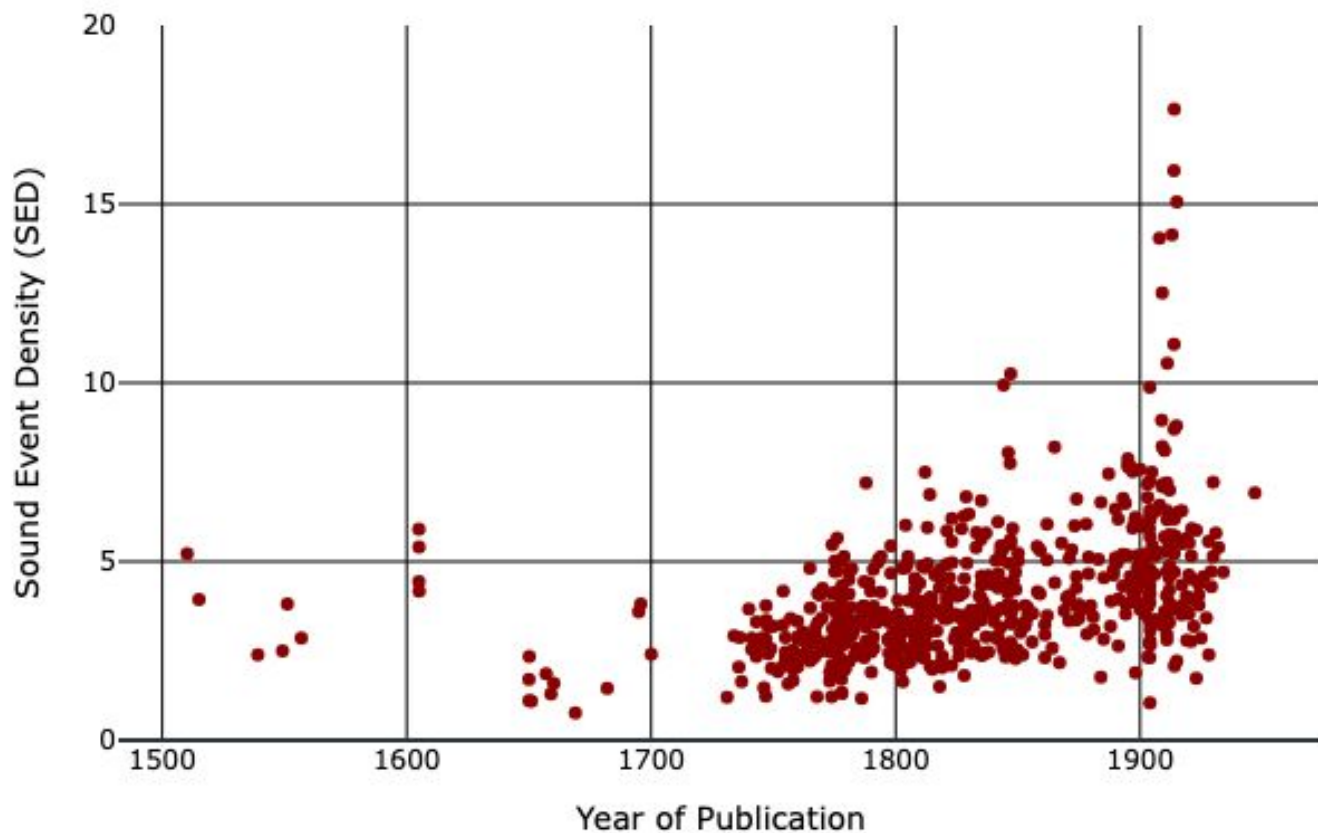
Sound Event Density Calculation (SED) developed by Guhr (2025)

T_{se} : absolute count of annotated sound events

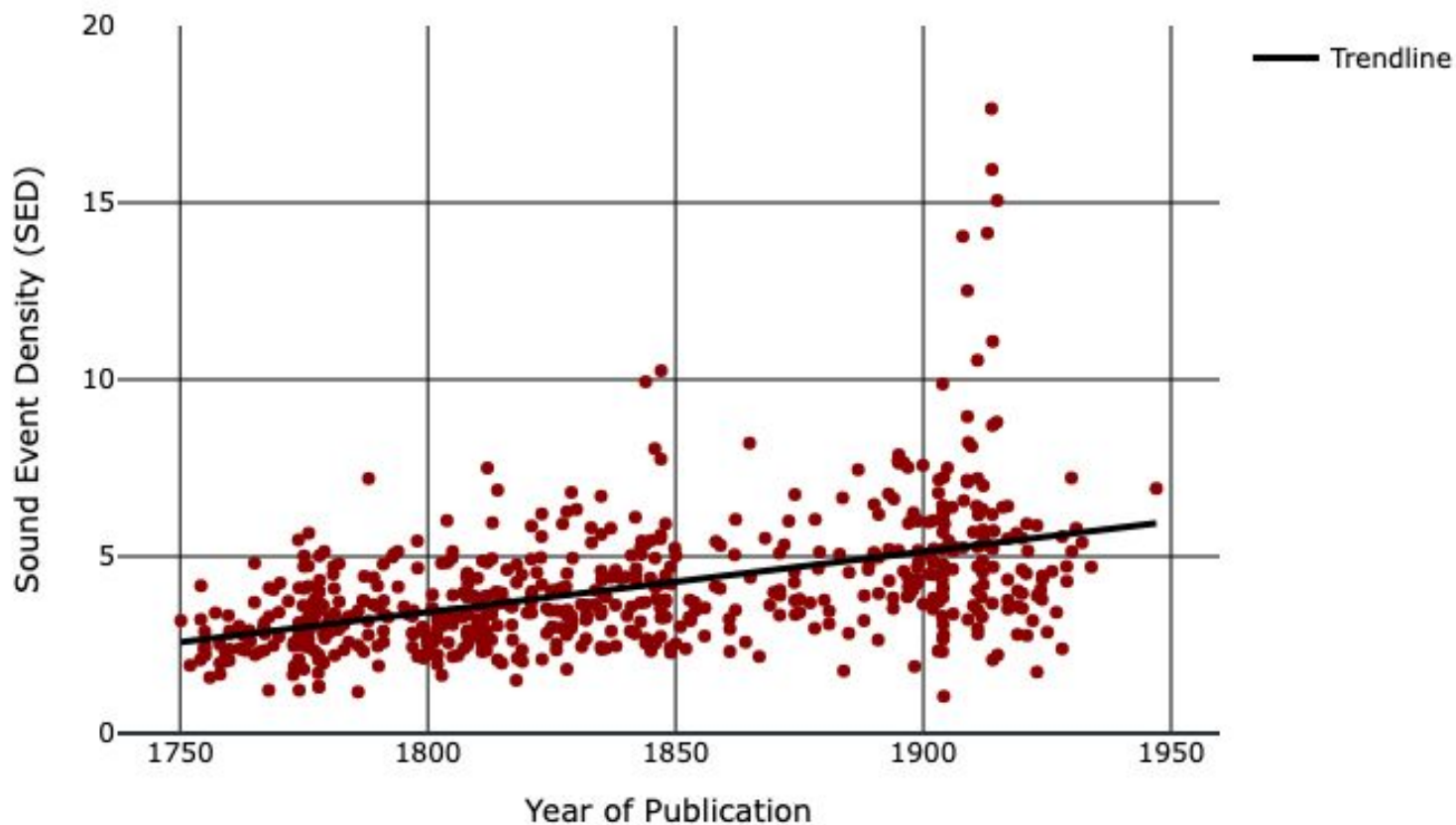
T_{pe} : number of potential events in a text

$$SE_D = \frac{T_{se}}{T_{pe}} \times 100$$

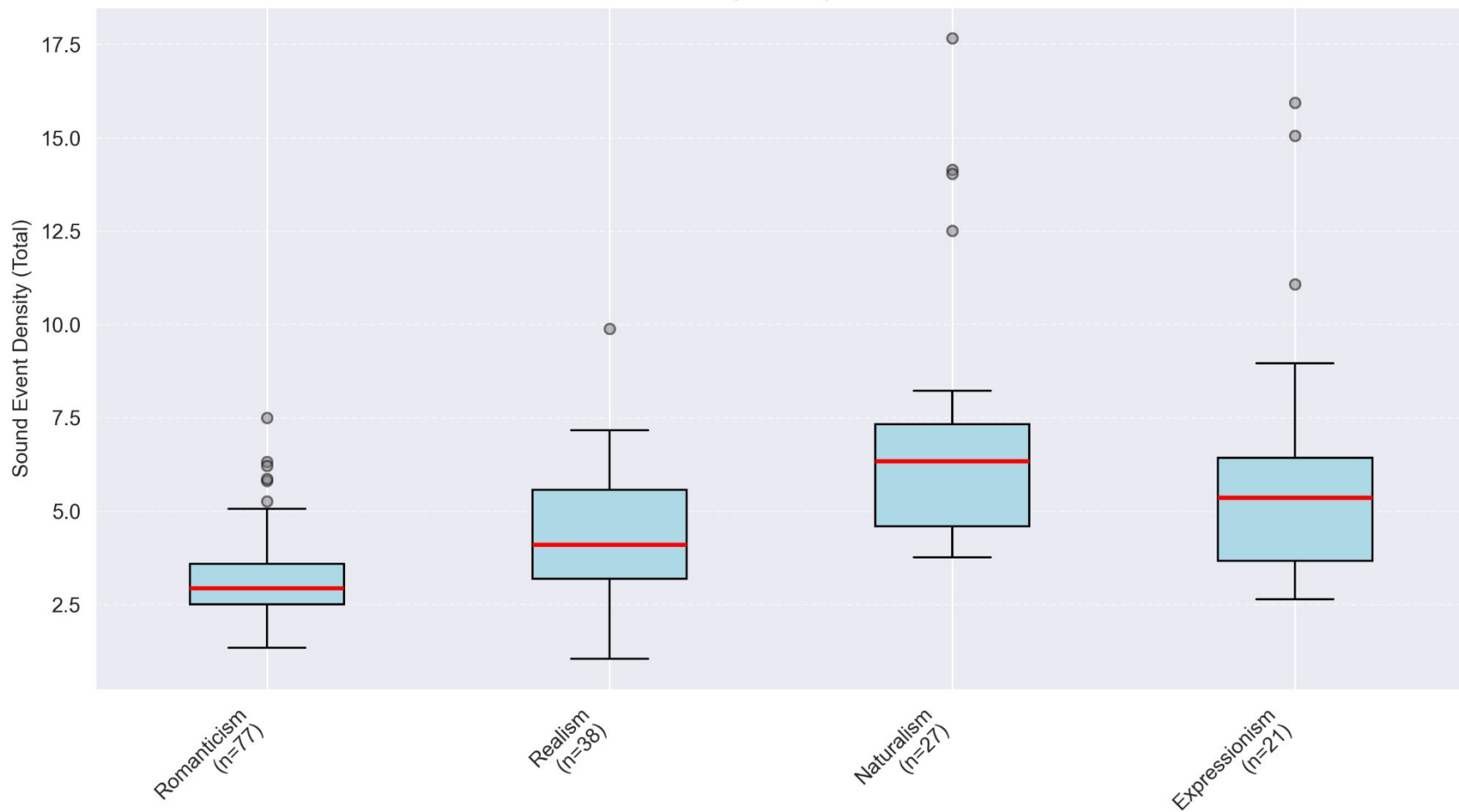
Sound Event Density per Text by Year (All Genres, n=649)



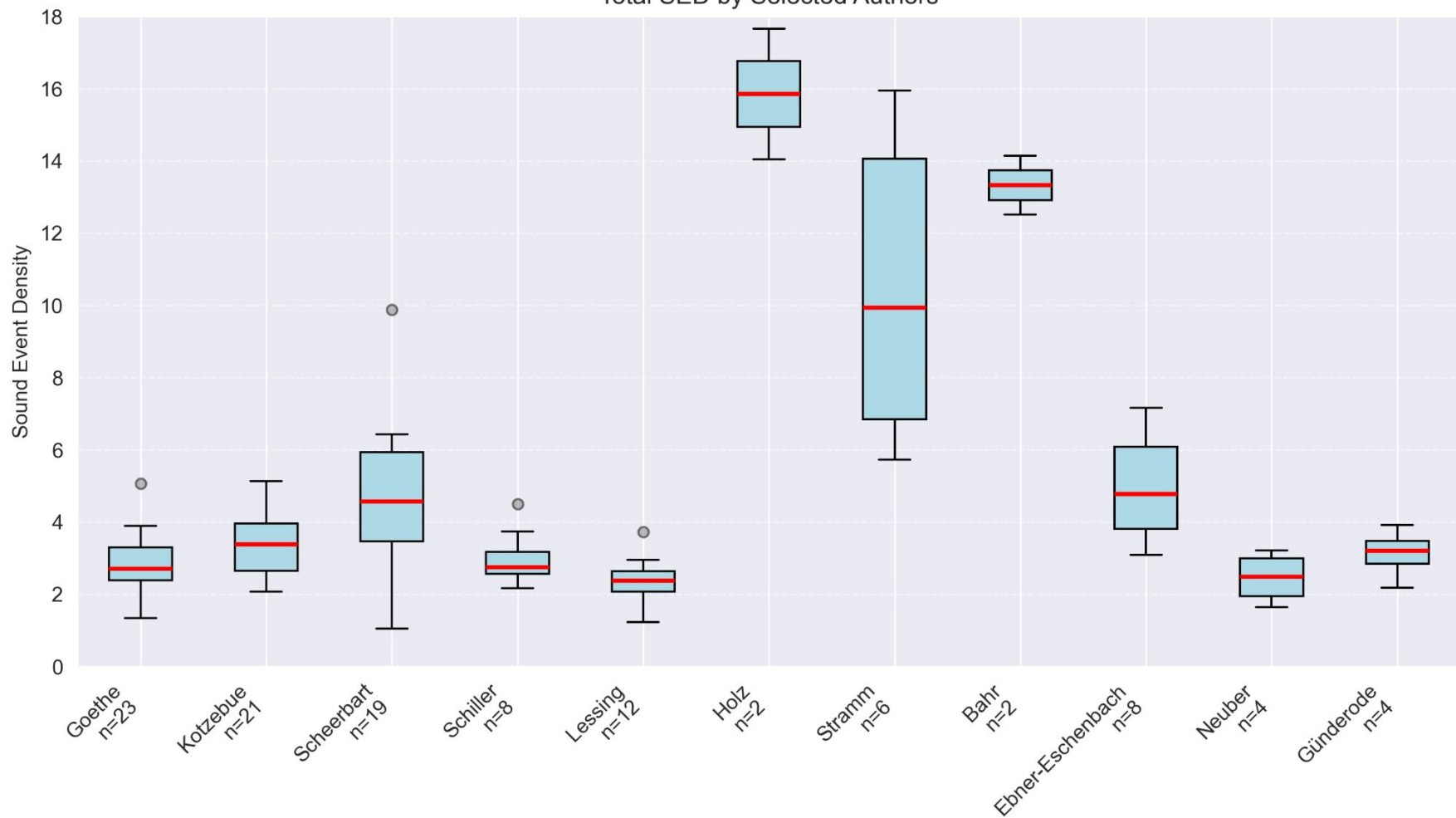
Sound Event Density per Text by Year (1750-1950, n=604)



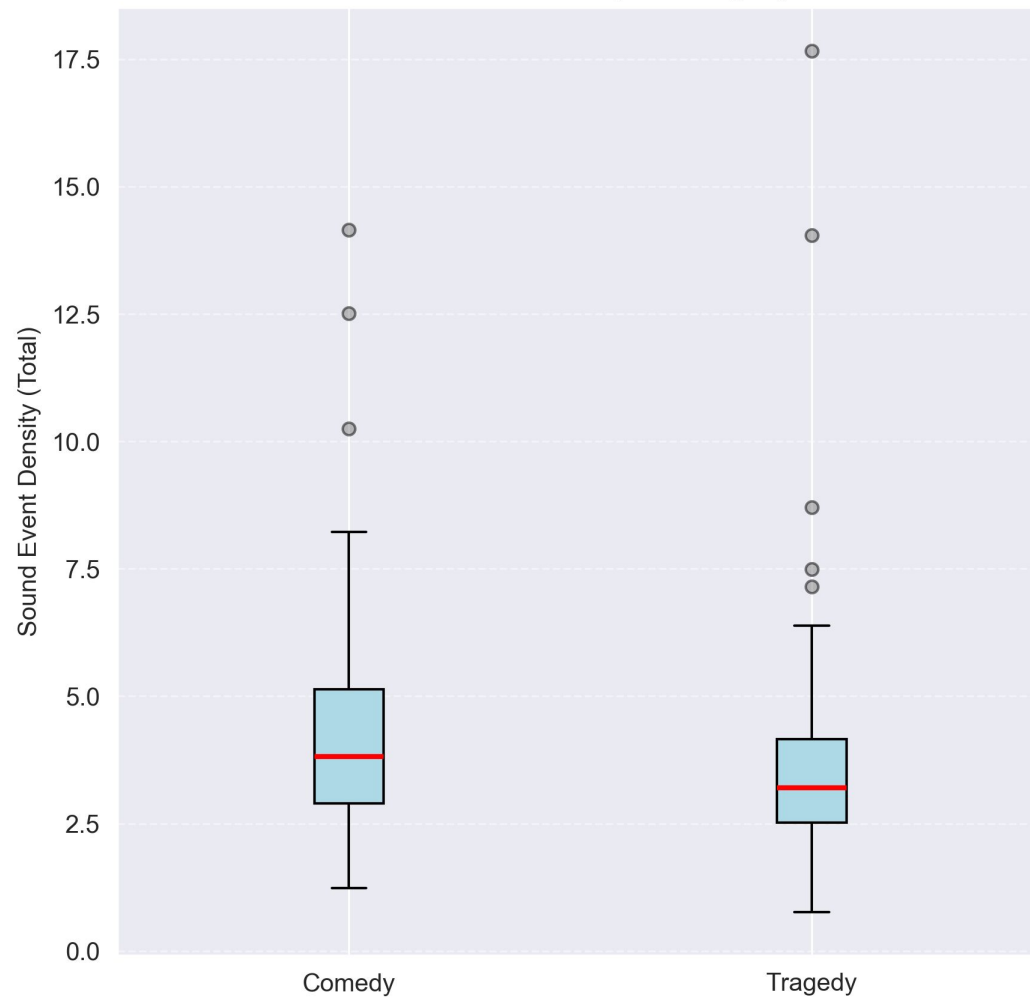
Total SED by Literary Movement



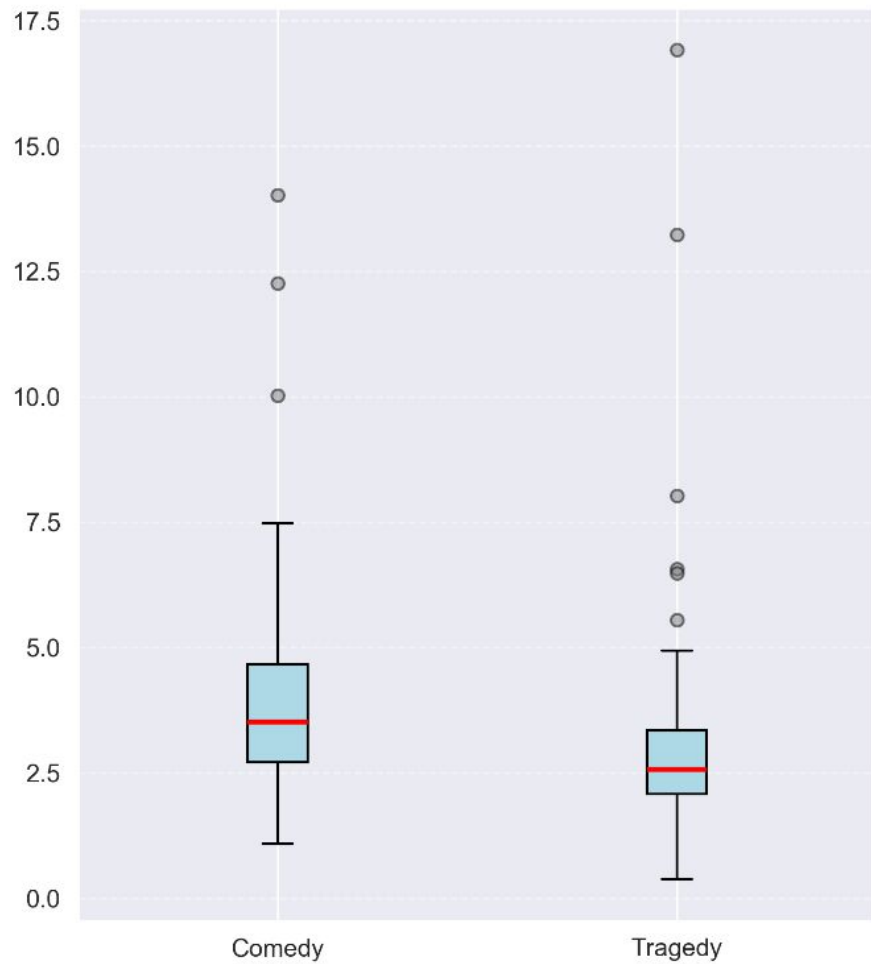
Total SED by Selected Authors



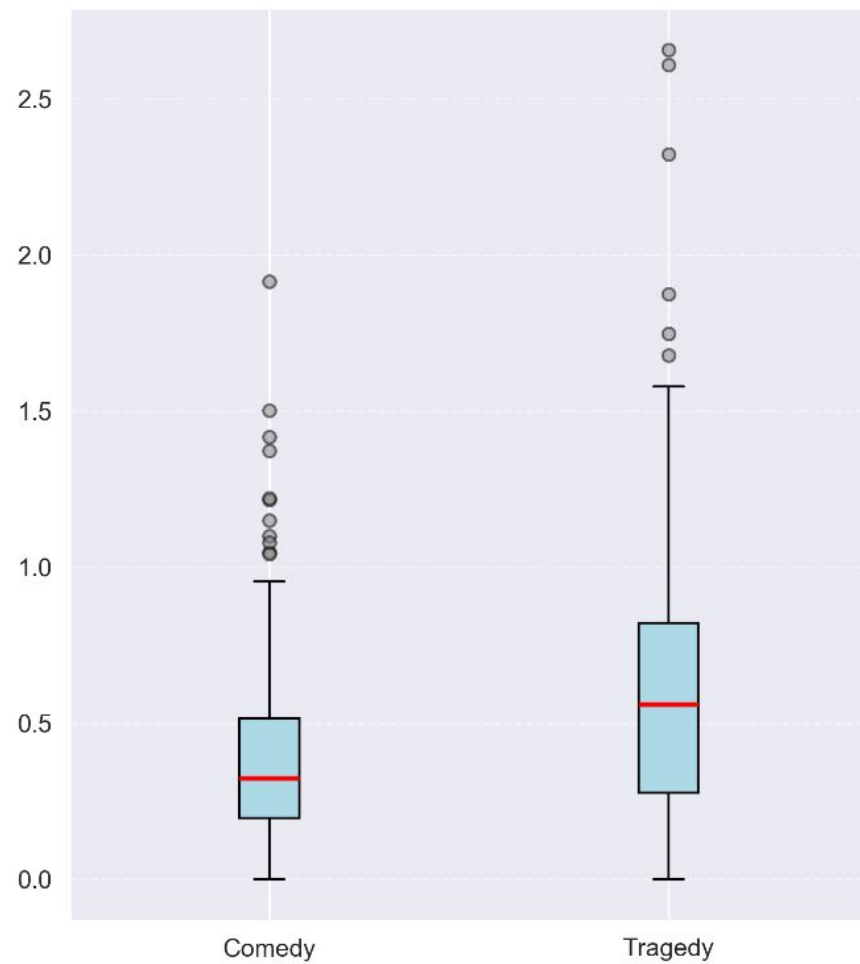
Total SED: Comedy vs. Tragedy



Character SED

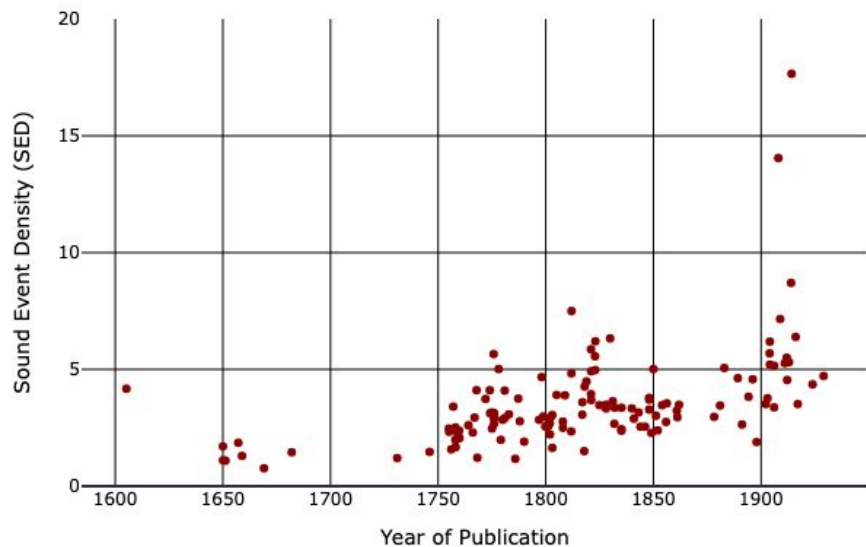


Ambient SED

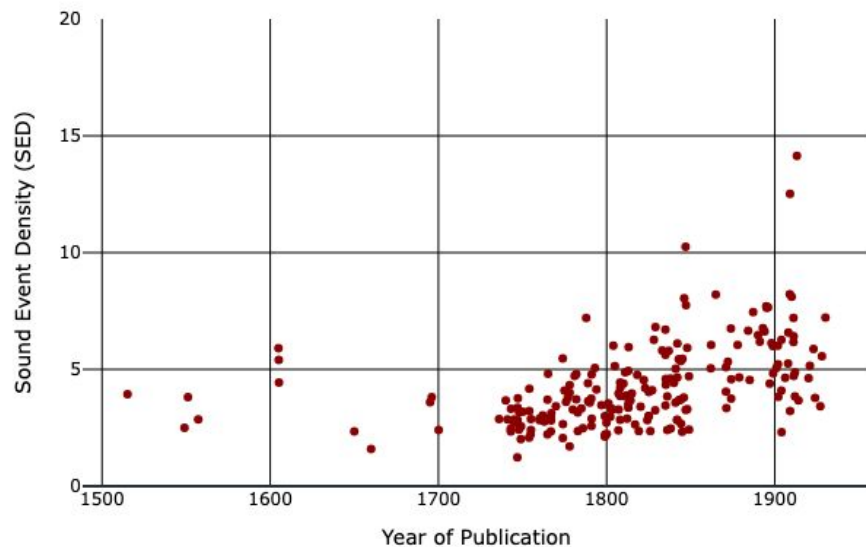


SED over the Course of GerDraCor by Subgenre

Sound Event Density per Text by Year (Tragedy, n=132)

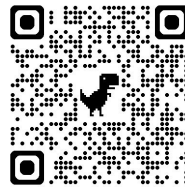


Sound Event Density per Text by Year (Comedy, n=211)



Conclusion and Outlook

- Re-using prosa annotations for model training does not help
 - Sound representation in drama offers new challenges for sound annotation
 - Heuristic worked out well - next step is to try the automation without stage direction augmentation → more manually sound-annotated plays needed
 - Over the course of GerDraCor sound representation increases significantly
 - Tragedies and comedies work differently sound-wise
 - Current approach focuses on frequency analysis based on SED calculations
- New content-oriented research questions arise, e.g.:
- What kind of sounds are represented?
 - Are there sound-groups beyond character and ambient sounds?
 - Do characters of different gender produce different sounds?
- Add loudness levels for comparative analysis



What Does Drama Sound Like?

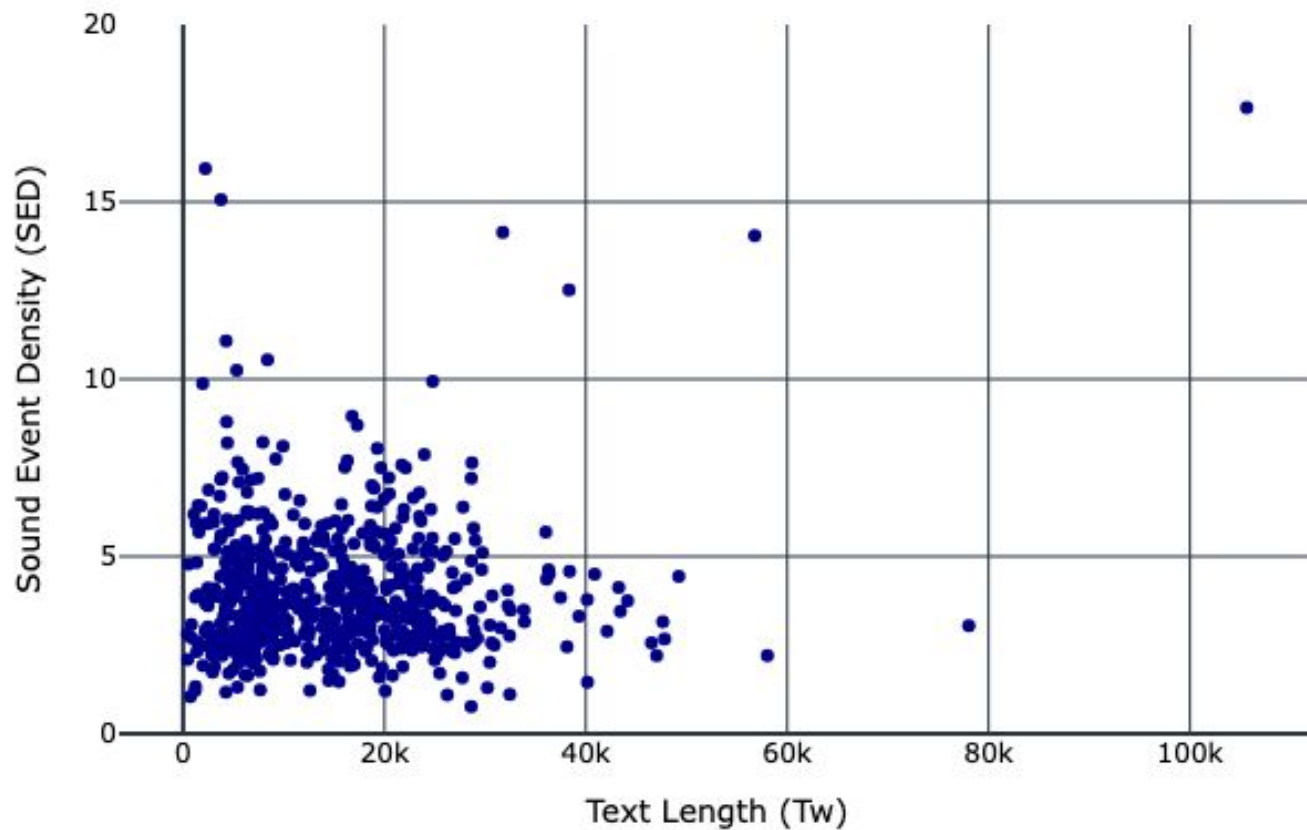
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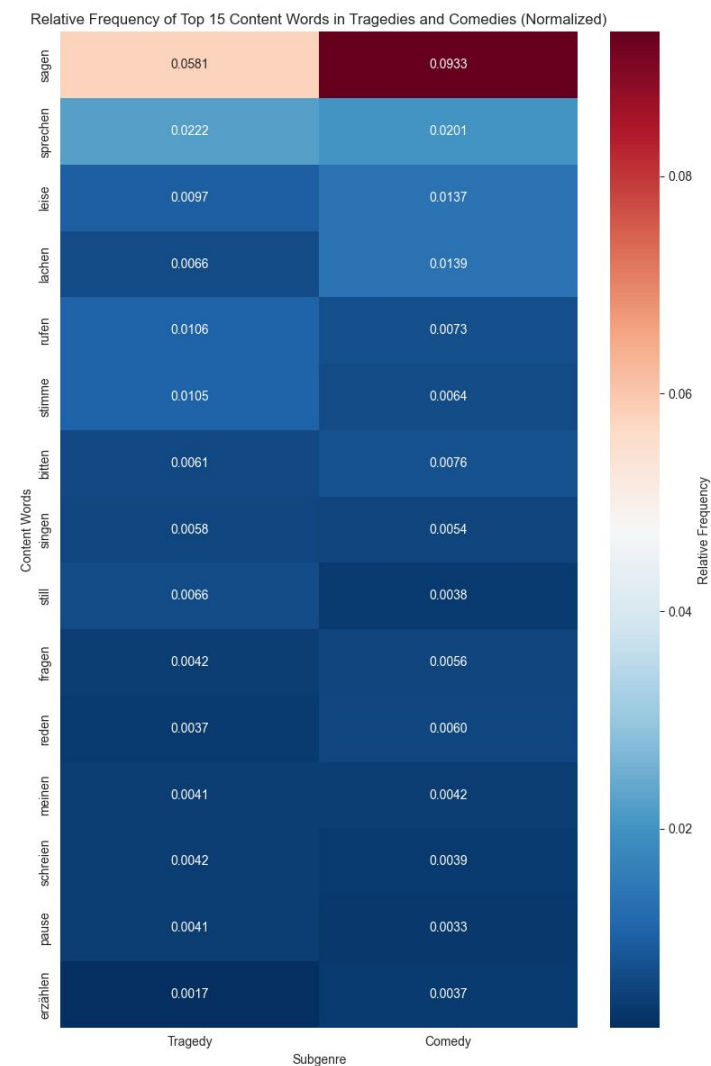
Janis Pagel, Svenja Guhr, Nils Reiter

Appendix

Sound Event Density vs. Text Length



Most Frequent Words per Subgenre



Interesting Sample Passages

- reported speech:

<p><character_sound>Ich sage dir alles</character_sound>. – Ich habe es teils aus Büchern, teils aus Illustrationen, teils aus Beobachtungen in der Natur. Du wirst überrascht sein; ich wurde seinerzeit Atheist. <character_sound>Ich habe es auch Georg Zirschnitz gesagt</character_sound>! Georg Zirschnitz wollte es Hänschen Rilow sagen, aber Hänschen Rilow hatte als Kind schon alles von seiner Gouvernante erfahren.</p> (Wedekind, *Frühlings Erwachen*)

- reported ambient sounds:

<p>[...] Du ziehst bei mir ein wie die angestammte Herrin in ihr verödetes Schloß. Tor und Türen öffnen sich von unsichtbarer Hand, <ambient_sound>während der Springquell unten im Parke fröhlich zu plätschern beginnt</ambient_sound> ...</p> (Wedekind, *Frühlings Erwachen*)

Interesting Sample Passages

- sound descriptions in stage directions

<sp who="#frau_bergmann">

<speaker>FRAU BERGMANN</speaker>

<stage><character_sound>ekstatisch.</character_sound></stage>

<p>– Aber es geht ja nicht, Kind! – Ich kann es ja nicht verantworten. – Ich verdiene ja, daß man mich ins Gefängnis setzt – daß man dich von mir nimmt ...</p> </sp> (Wedekind, *Frühlings Erwachen*)

- ambiguous descriptions in stage directions – greetings spoken or as gestures?

<stage>Melchior geht vorüber und grüßt.</stage> (Wedekind, *Frühlings Erwachen*)