Project Dialogism:

Toward a Computational History of Vocal Diversity in English-Language Fiction

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Introduction: Investigating Dialogism at Scale

- Our aim: to develop methods to permit us to study literary dialogism computationally and at scale, in order to answer questions such as:
  - Which literary texts and authors are the most dialogic?
  - How did dialogism develop chronologically (and how does its development correlate to political events)?
  - How did dialogism develop geographically? (Cf. Moretti)
  - Which genres are most dialogic?

Introduction: Investigating Dialogism at Scale

- This talk focuses on the methods we've developed to approach these questions, and closes with some results and some theoretical reflections.
  - Six-dimensional approach to quantifying literary style
  - GutenTag
  - Calculating dialogism
  - Preliminary results
  - Theoretical reflections: Are we really measuring dialogism?

The Six-Dimensional Approach to Literary Style

1. Objectivity (words that project a sense of disinterested authority, e.g. “invariable,” “ancillary”)
2. Abstractness (words denoting concepts that cannot be described in purely physical terms, and which require significant cultural knowledge to understand, such as “solipsism” and “alienation”)
3. Literariness (words normally found in traditionally literary texts such as “wanton” and “yonder”)

The Six-Dimensional Approach to Literary Style

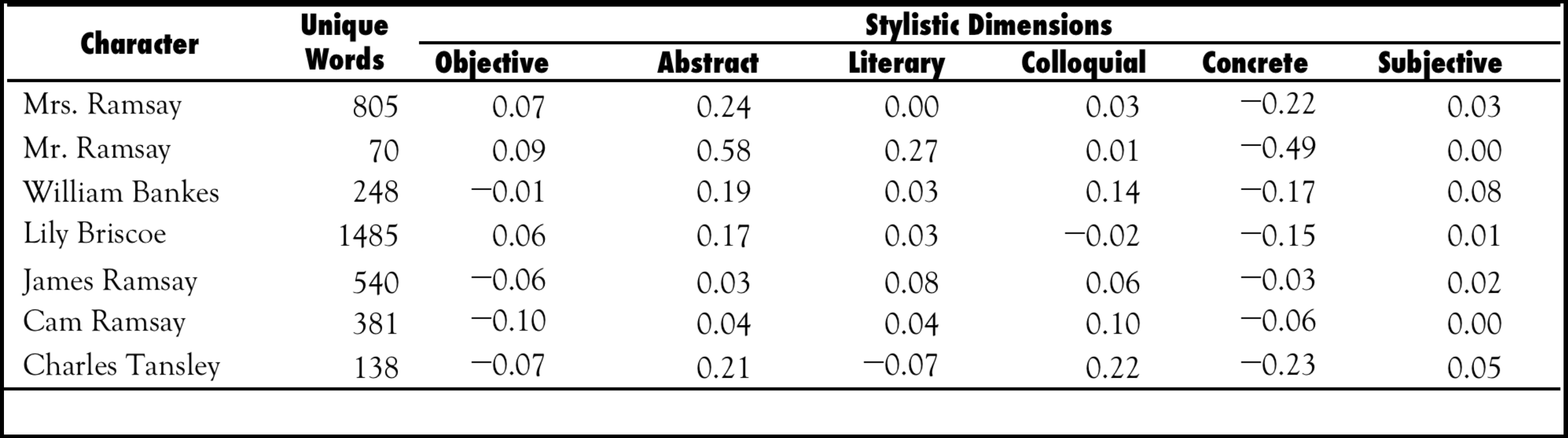
4. Colloquialness (words used in informal contexts such as “booze” and “crap”)
5. Concreteness (words referring to events, objects, or properties in the physical world, such as “radish” and “freeze”)
6. Subjectivity (words that are strongly personal or reflect a personal opinion, such as “ugly” and “bastard”)

The Six-Dimensional Approach to Literary Style

- Process:
  - Human annotators review list of 900 words carefully chosen for stylistic properties
  - We use this information to derive stylistic information for all words in 2010 DVD image of Project Gutenberg (> 24k texts)
  - This data can be used to produce stylistic profiles for any span of text, i.e., a span of character speech

The Six-Dimensional Approach to Literary Style

- Sample stylistic profiles for characters in Virginia Woolf's *To the Lighthouse*:

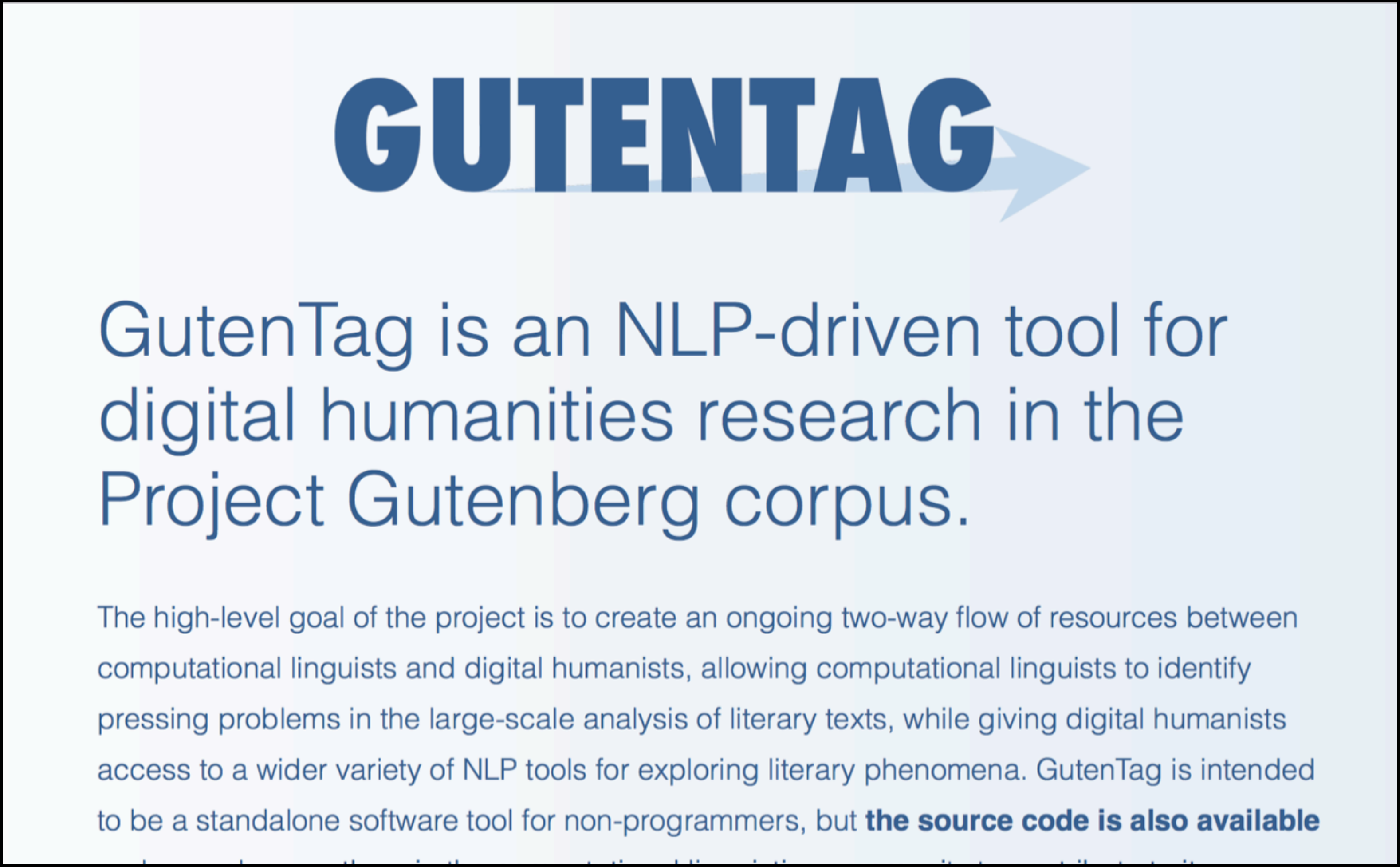


Character	Unique Words	Stylistic Dimensions					
		Objective	Abstract	Literary	Colloquial	Concrete	Subjective
Mrs. Ramsay	805	0.07	0.24	0.00	0.03	−0.22	0.03
Mr. Ramsay	70	0.09	0.58	0.27	0.01	−0.49	0.00
William Bankes	248	−0.01	0.19	0.03	0.14	−0.17	0.08
Lily Briscoe	1485	0.06	0.17	0.03	−0.02	−0.15	0.01
James Ramsay	540	−0.06	0.03	0.08	0.06	−0.03	0.02
Cam Ramsay	381	−0.10	0.04	0.04	0.10	−0.06	0.00
Charles Tansley	138	−0.07	0.21	−0.07	0.22	−0.23	0.05

The Six-Dimensional Approach to Literary Style

- For detailed explanations and discussions, see:
  - Brooke, Hammond, and Hirst, "Using Models of Lexical Style to Quantify Free Indirect Discourse in Modernist Fiction," *Digital Scholarship in the Humanities* (Advance Access, February 2016).
  - Hammond, Brooke, and Hirst, "Modeling Modernist Dialogism: Close Reading with Big Data," *Reading Modernism with Machines*, eds. Shawna Ross and James O'Sullivan (Forthcoming, Palgrave Macmillan, 2016).

GutenTag (www.projectgutentag.org)



GUTENTAG

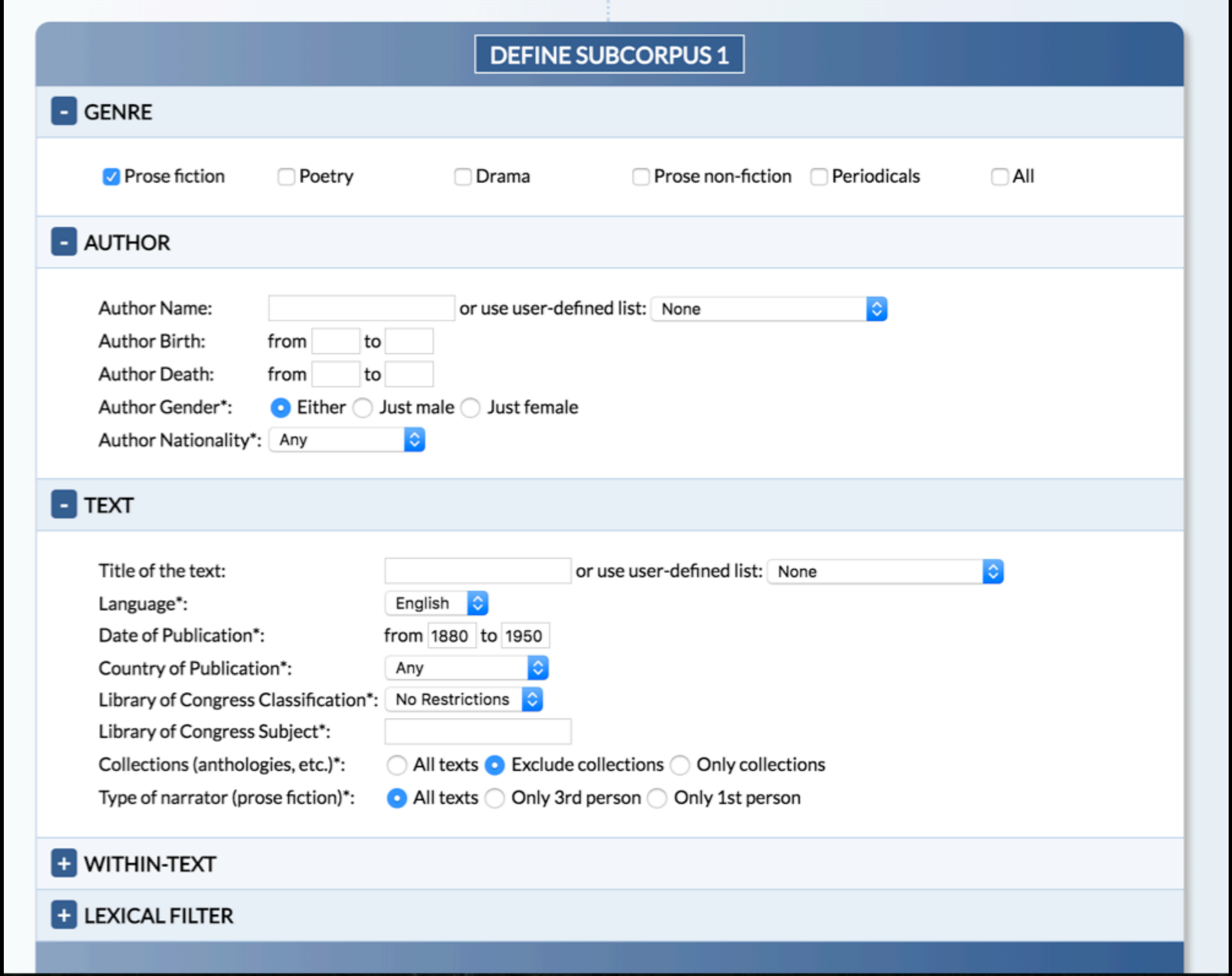
GutenTag is an NLP-driven tool for digital humanities research in the Project Gutenberg corpus.

The high-level goal of the project is to create an ongoing two-way flow of resources between computational linguists and digital humanists, allowing computational linguists to identify pressing problems in the large-scale analysis of literary texts, while giving digital humanists access to a wider variety of NLP tools for exploring literary phenomena. GutenTag is intended to be a standalone software tool for non-programmers, but **the source code is also available**

GutenTag (www.projectgutentag.org)

- Open-source software tool for computational research in Project Gutenberg corpora (USA, >44k texts; Australia, 2.5k texts; Canada, 1.5k texts)
- Why PG? Because it's big, it's clean, it's public domain, and it's free
- GutenTag allows users to quickly build large, customized worksets, relying on PG metadata, derived metadata, and a built-in genre classifier
- For instance, one can quickly collect all prose fiction published between 1880 and 1950, excluding collections

GutenTag (www.projectgutentag.org)



DEFINE SUBCORPUS 1

- GENRE

☑ Prose fiction □ Poetry □ Drama □ Prose non-fiction □ Periodicals □ All

- AUTHOR

Author Name: or use user-defined list: None
Author Birth: from to
Author Death: from to
Author Gender*: ● Either ○ Just male ○ Just female
Author Nationality*: Any

- TEXT

Title of the text: or use user-defined list: None
Language*: English
Date of Publication*: from 1880 to 1950
Country of Publication*: Any
Library of Congress Classification*: No Restrictions
Library of Congress Subject*:
Collections (anthologies, etc.)*: ○ All texts ● Exclude collections ○ Only collections
Type of narrator (prose fiction)*: ● All texts ○ Only 3rd person ○ Only 1st person

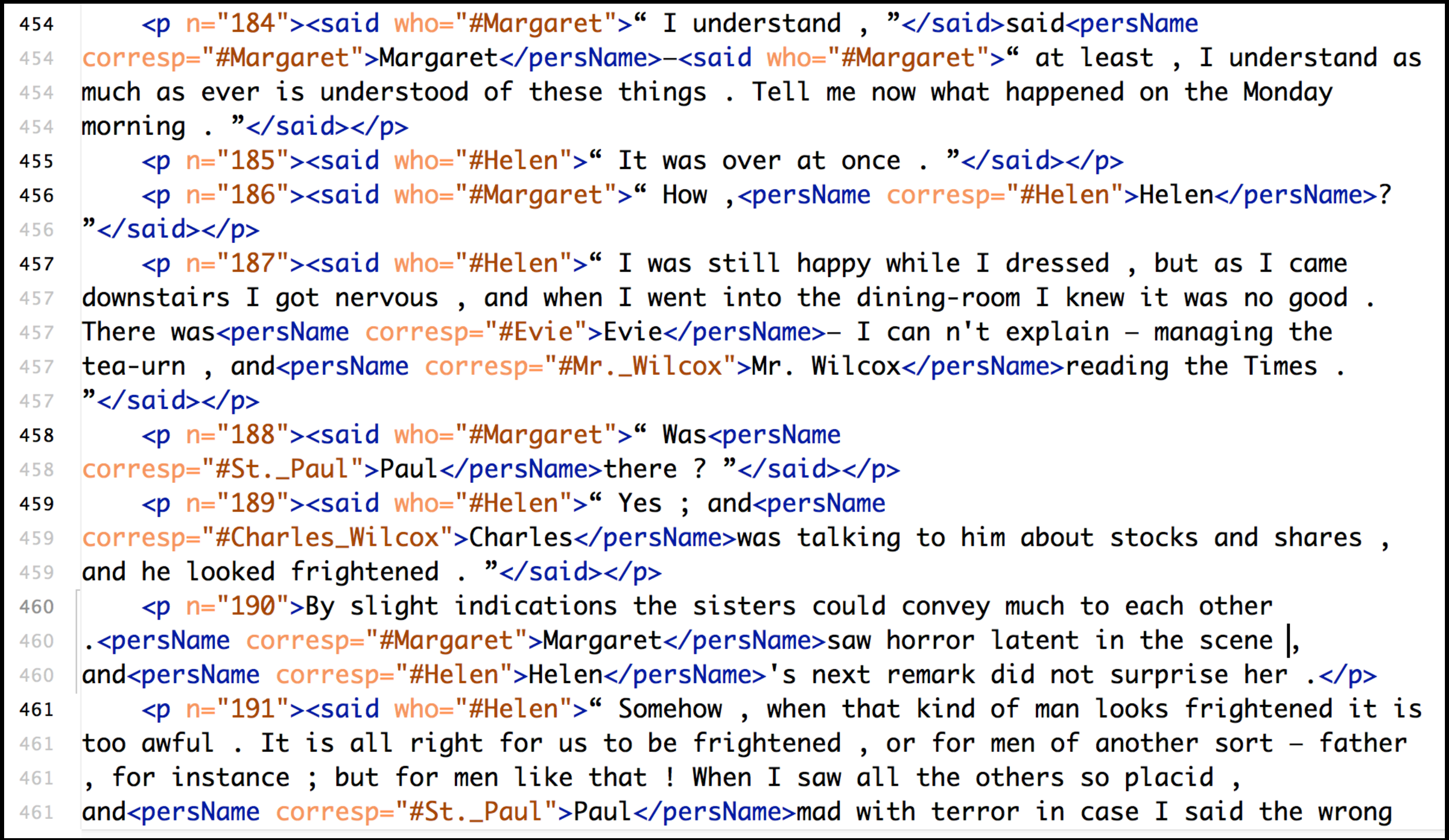
+ WITHIN-TEXT

+ LEXICAL FILTER

GutenTag (www.projectgutentag.org)

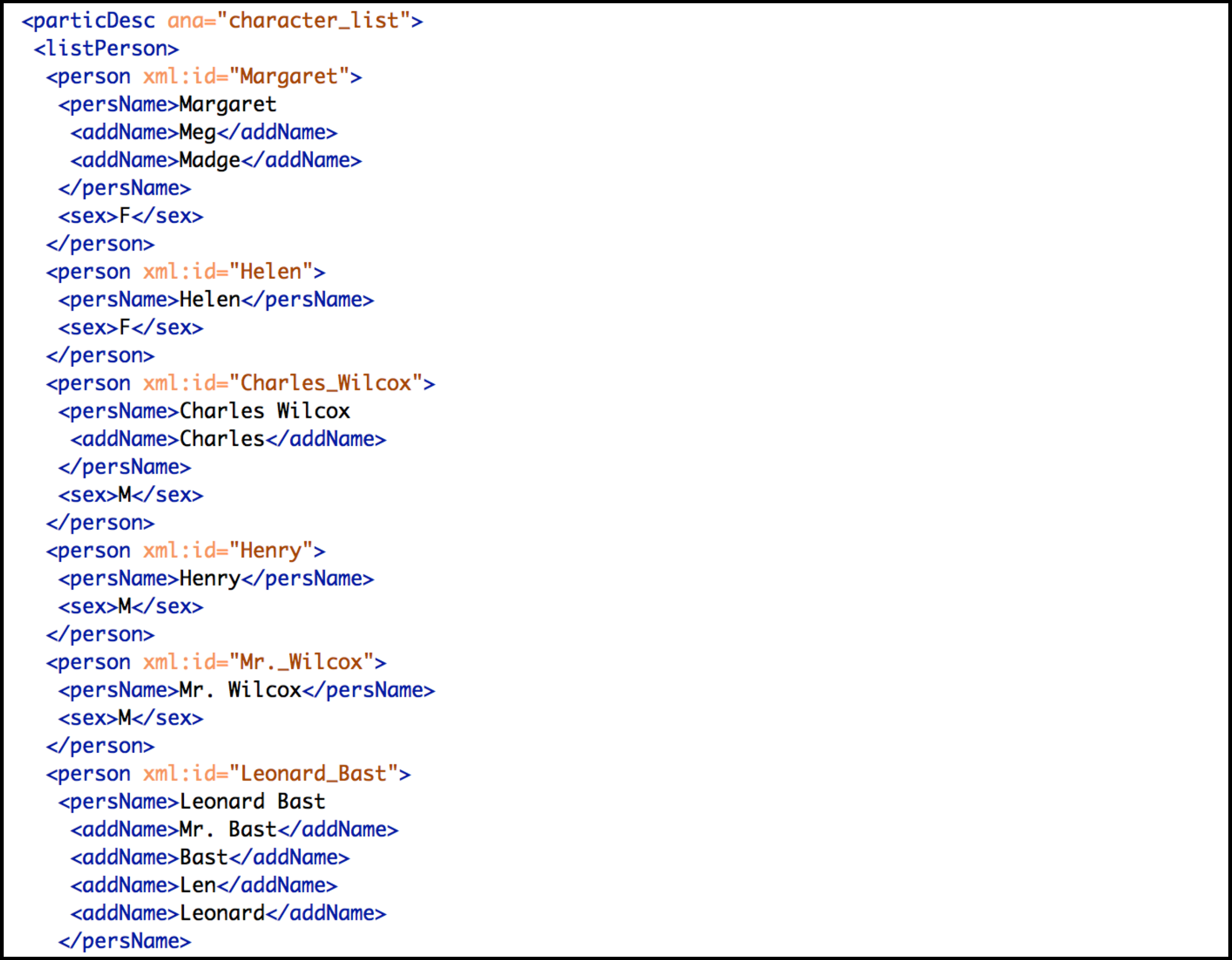
- Can export as plain text or TEI XML
- The latter uses sophisticated ruled-based system to produce structural tags, distinguish narration from character speech, generate lists of characters, and associate spans of speech with specific characters
- Also uses our own literature-specific NER system, LitNER, which outperforms leading NER systems on literary texts

GutenTag (www.projectgutentag.org)



```
    <p n="184"><said who="#Margaret">“ I understand , ”</said>said<persName
corresp="#Margaret">Margaret</persName>–<said who="#Margaret">“ at least , I understand as
much as ever is understood of these things . Tell me now what happened on the Monday
morning . ”</said></p>
    <p n="185"><said who="#Helen">“ It was over at once . ”</said></p>
    <p n="186"><said who="#Margaret">“ How ,<persName corresp="#Helen">Helen</persName>?
”</said></p>
    <p n="187"><said who="#Helen">“ I was still happy while I dressed , but as I came
downstairs I got nervous , and when I went into the dining-room I knew it was no good .
There was<persName corresp="#Evie">Evie</persName>– I can n't explain – managing the
tea-urn , and<persName corresp="#Mr._Wilcox">Mr. Wilcox</persName>reading the Times .
”</said></p>
    <p n="188"><said who="#Margaret">“ Was<persName
corresp="#St._Paul">Paul</persName>there ? ”</said></p>
    <p n="189"><said who="#Helen">“ Yes ; and<persName
corresp="#Charles_Wilcox">Charles</persName>was talking to him about stocks and shares ,
and he looked frightened . ”</said></p>
    <p n="190">By slight indications the sisters could convey much to each other
.<persName corresp="#Margaret">Margaret</persName>saw horror latent in the scene ,
and<persName corresp="#Helen">Helen</persName>'s next remark did not surprise her .</p>
    <p n="191"><said who="#Helen">“ Somehow , when that kind of man looks frightened it is
too awful . It is all right for us to be frightened , or for men of another sort – father
, for instance ; but for men like that ! When I saw all the others so placid ,
and<persName corresp="#St._Paul">Paul</persName>mad with terror in case I said the wrong
```

GutenTag (www.projectgutentag.org)



```
<particDesc ana="character_list">
 <listPerson>
  <person xml:id="Margaret">
   <persName>Margaret
    <addName>Meg</addName>
    <addName>Madge</addName>
   </persName>
   <sex>F</sex>
  </person>
  <person xml:id="Helen">
   <persName>Helen</persName>
   <sex>F</sex>
  </person>
  <person xml:id="Charles_Wilcox">
   <persName>Charles Wilcox
    <addName>Charles</addName>
   </persName>
   <sex>M</sex>
  </person>
  <person xml:id="Henry">
   <persName>Henry</persName>
   <sex>M</sex>
  </person>
  <person xml:id="Mr._Wilcox">
   <persName>Mr. Wilcox</persName>
   <sex>M</sex>
  </person>
  <person xml:id="Leonard_Bast">
   <persName>Leonard Bast
    <addName>Mr. Bast</addName>
    <addName>Bast</addName>
    <addName>Len</addName>
    <addName>Leonard</addName>
   </persName>
```

GutenTag (www.projectgutentag.org)

- Try it yourself in downloadable and online beta versions at http://www.projectgutentag.org/
- See also:
  - Brooke, Hammond, and Hirst, "GutenTag: an NLP-driven Tool for Digital Humanities Research in the Project Gutenberg Corpus." *Workshop on Computational Linguistics for Literature* (North American Association for Computational Linguistics, June 2015).
  - Brooke, Hammond, and Baldwin, "Bootstrapped Text-level Named Entity Recognition for Literature." *Association for Computational Linguistics* (Berlin, August 2016).

Calculating Dialogism

- Initial idea: for each style, treat each character as datapoint and calculate weighted variance (weighted by relative proportion of speech by each character) to produce number indicating stylistic variation across characters for that dimension, and average across styles for overall number
- In practice, unequal spans of text for characters produced unreliable results (short spans tended to produce extreme stylistic results)

Calculating Dialogism

- Revised approach: base metric on stylistic distances between the narrator and two clusters of characters.
- Clusters are formed by grouping the speech of characters with similar styles.
- Parameters include:
    - Minimum words necessary to include character
    - Sample size for direct comparisons, and number of times to compare samples (this helps get useful results when clusters are of different sizes)

Calculating Dialogism

- Clusters for E. M. Forster's *Howards End* with sample size set to 1000 and minimum character words set to 200:
    - Narrator
    - Characters 1: Margaret, Helen, Tibby, Henry
    - Characters 2: Mrs. Wilcox, Dolly, Mrs. Munt, Evie, Miss Avery, Charles Wilcox, Miss Schlegel, Mr. Wilcox, Leonard Bast

Calculating Dialogism

- For *Howards End*, the algorithm found that the two characters groups were strongly differentiated ($p < 0.01$) in 5 of 6 dimensions — abstract, objective, colloquial, concrete, and subjective — with the most significant distinctions ($p < 0.0001$) in colloquial and concrete.
    - Characters 1: Margaret, Helen, Tibby, Henry
    - Characters 2: Mrs. Wilcox, Dolly, Mrs. Munt, Evie, Miss Avery, Charles Wilcox, Miss Schlegel, Mr. Wilcox, Leonard Bast

Preliminary Results

- Workset composed of GutenTag matches for prose fiction (no collections) published between 1880 and 1950 in PG USA (3608 results), Australia (838), and Canada (565). Texts shorter than *Heart of Darkness* excluded, as well as one long collection of novels.
- Total of 4008 texts included in experiment.
- Parameters as follows:
    - Minimum character words: 200
    - Word sample size: 1000
    - Samples: 50

Preliminary Results

- Output can be filtered in terms of stylistic difference between:
  - Narrator vs. all characters
  - Narrator vs. character cluster 1
  - Narrator vs. character cluster 2
  - Character cluster 1 vs. character cluster 2

Preliminary Results: Some Interesting Findings

- Stephen Crane's *The Red Badge of Courage* has the highest difference in two categories: narration vs. all characters, and narration vs. character group 1.
- Virginia Woolf's *The Waves* has the twelfth-lowest difference between narration and character group 2.
- Upton Sinclair's *The Jungle* has the fourth-highest difference between character clusters.
- Zane Grey's novels appear consistently in top-ten groupings of high stylistic difference in all categories.

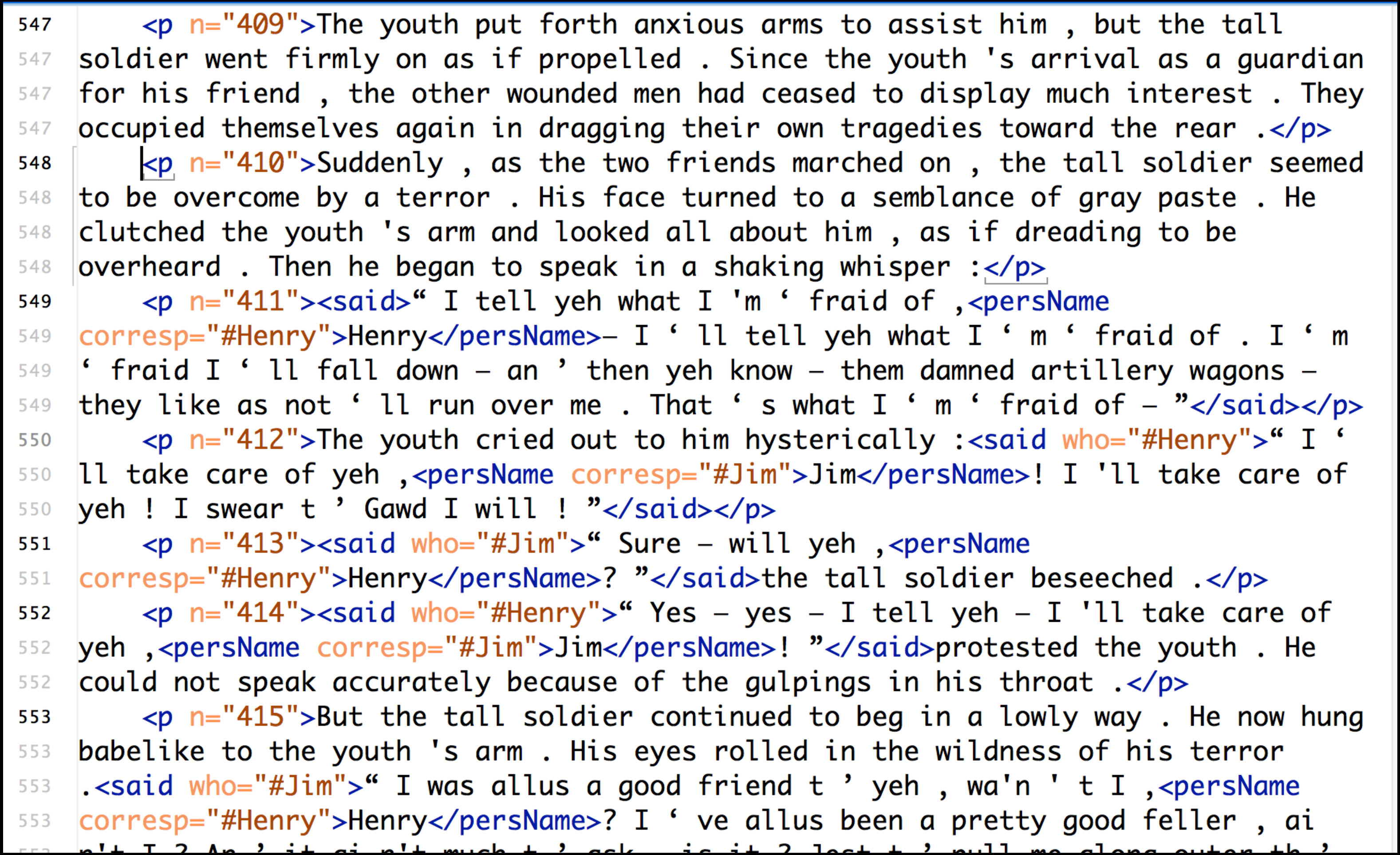
Preliminary Results

- Top ten results for highest difference between narrator and all characters:
  1. *The Red Badge of Courage* by Stephen Crane
  2. *Teddy and Carrots Two Merchants of Newspaper Row* by James Otis
  3. *Notes of an Itinerant Policeman* by Josiah Flynt
  4. *Drag Harlan* by Charles Alden Seltzer
  5. *The Ridin' Kid from Powder River* by Henry Herbert Knibbs
  6. *Strangers at Lisconnel* by Jane Barlow
  7. *The Drift Fence* by Zane Grey
  8. *Sundown Slim* by Henry Herbert Knibbs
  9. *Connie Morgan in Alaska* by James B. Hendryx
  10. *Tales of Lonely Trails* by Zane Grey

Preliminary Results

- In *The Red Badge of Courage*, narration is distinguished from character speech at $p < 0.00001$ in all six styles, but character clusters are poorly distinguished (the exception is abstract, where $p < 0.05$).

Preliminary Results



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    <p n="409">The youth put forth anxious arms to assist him , but the tall
soldier went firmly on as if propelled . Since the youth 's arrival as a guardian
for his friend , the other wounded men had ceased to display much interest . They
occupied themselves again in dragging their own tragedies toward the rear .</p>
    <p n="410">Suddenly , as the two friends marched on , the tall soldier seemed
to be overcome by a terror . His face turned to a semblance of gray paste . He
clutched the youth 's arm and looked all about him , as if dreading to be
overheard . Then he began to speak in a shaking whisper :</p>
    <p n="411"><said>“ I tell yeh what I 'm ‘ fraid of ,<persName
corresp="#Henry">Henry</persName>– I ‘ ll tell yeh what I ‘ m ‘ fraid of . I ‘ m
‘ fraid I ‘ ll fall down – an ’ then yeh know – them damned artillery wagons –
they like as not ‘ ll run over me . That ‘ s what I ‘ m ‘ fraid of – ”</said></p>
    <p n="412">The youth cried out to him hysterically :<said who="#Henry">“ I ‘
ll take care of yeh ,<persName corresp="#Jim">Jim</persName>! I 'll take care of
yeh ! I swear t ’ Gawd I will ! ”</said></p>
    <p n="413"><said who="#Jim">“ Sure – will yeh ,<persName
corresp="#Henry">Henry</persName>? ”</said>the tall soldier beseeched .</p>
    <p n="414"><said who="#Henry">“ Yes – yes – I tell yeh – I 'll take care of
yeh ,<persName corresp="#Jim">Jim</persName>! ”</said>protested the youth . He
could not speak accurately because of the gulpings in his throat .</p>
    <p n="415">But the tall soldier continued to beg in a lowly way . He now hung
babelike to the youth 's arm . His eyes rolled in the wildness of his terror
.<said who="#Jim">“ I was allus a good friend t ’ yeh , wa'n ' t I ,<persName
corresp="#Henry">Henry</persName>? I ‘ ve allus been a pretty good feller , ai
n't I ? An ’ it ai n't much t ’ ask , is it ? Jest t ’ pull me along outer th ’
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Are We Really Measuring Dialogism?

A plurality of independent and unmerged voices and consciousnesses, a genuine polyphony of fully valid voices is in fact the chief characteristic of Dosotoevsky's novels. (6)

Dostoevsky's novel is *multi-styled* or *styleless* […] *multi-accented* and contradictory in its values. (15)

— M. M. Bakhtin, *Problems of Doestoevsky's Poetics*

Are We Really Measuring Dialogism?

From the vantage points provided by *pure* linguistics, it is impossible to detect […] any really essential differences between a monologic and a polyphonic use of discourse.

What matters here is not the mere presence of specific language styles, social dialects, and so forth, a presence established by purely linguistic criteria; what matters is the *dialogic angle* at which these styles and dialects are juxtaposed or counterposed in the work. (182)

— M. M. Bakhtin, *Problems of Doestoevsky's Poetics*

Are We Really Measuring Dialogism?

Prose, and especially the novel, is completely beyond the reach of such a stylistics. […] For the prose artist the world is full of other people's words, among which he must orient himself and whose speech characteristics he must be able to perceive with a very keen ear. […] And we, when perceiving prose, orient ourselves very subtly among all the types and varieties of discourse analyzed above. […] We very sensitively catch the smallest shift in intonation, the slightest interruption of voices in anything of importance to us in another person's practical everyday discourse. (201)

— M. M. Bakhtin, *Problems of Doestoevsky's Poetics*

A Closing Thought

Seems a bit too much emphasis on deflation to me, especially if that’s what ends the talk.

— Julian Brooke