

Dr. Svenja Guhr

# Literary Soundscapes: Operationalization and Analysis

05/21/2025, 4-6 pm



*fortext lab*



Computational  
**LITERARY STUDIES**

# Dr. Svenja Guhr



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Computational  
**LITERARY STUDIES**



- B.A. (2016) and M.A. (2019) in Romance Languages with Minors in Law and Computational Linguistics
  - University of Bremen, DE
  - University of Göttingen, DE
  - Université de Strasbourg, FR
  - Università di Pavia, IT
  - University of Cambridge, UK
- Ph.D. in Computational Literary Studies / German Studies (2024)
  - supervised by Prof. Dr. Evelyn Gius, TU Darmstadt, DE
  - 2019–2025: Research Associate at *fortext lab*, TU Darmstadt, DE
  - since 2021: Editorial Assistant, *Journal of Computational Literary Studies*
- Visiting Researcher at *Stanford Literary Lab*, USA (since 2022)
- DFG 2207 SPP-CLS Visiting Fellow in the CompAnno Project, University of Cologne, DE (March – June 2025)
- Soon: Bellwether Postdoc at School of Information, UC Berkeley, USA



← Personal Website

# Sound in Literary Fiction

“

# Sound in Literary Fiction

“But there was nothing on the back of the door, except the screws and nuts that held the knocker on, so he said, “Pooh, pooh!” and closed it with a bang. The sound resounded through the house like thunder. [...]

He tried to say ‘Humbug!’ but stopped at the first syllable. [...]

The curtains of his bed were drawn aside, I tell you, by a hand. [...]

“Jacob!” he said imploringly. “Old Jacob Marley, tell me more! Speak comfort to me Jacob!” “I have none to give”, the Ghost replied. “It comes from other regions, Ebenezer Scrooge, and is conveyed by other ministers to other kinds of men. Nor can I tell you what I would. [...]

*(A Christmas Carol, C. Dickens)*

# Sound in Literary Fiction



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# Research Questions

1. How can the literary phenomena 'sound' and 'loudness' be systematically operationalized for their manual and automatic recognition, classification, and annotation in literary prose?
2. What can we find out about the fictional sounds represented in the Dickens' Novel Corpus (DNov)?

# Talk Outline

1. Theory
2. Operationalization
3. Automation
4. Sound Analysis of *DNov* – 15 Dickens' texts + *A Christmas Carol*

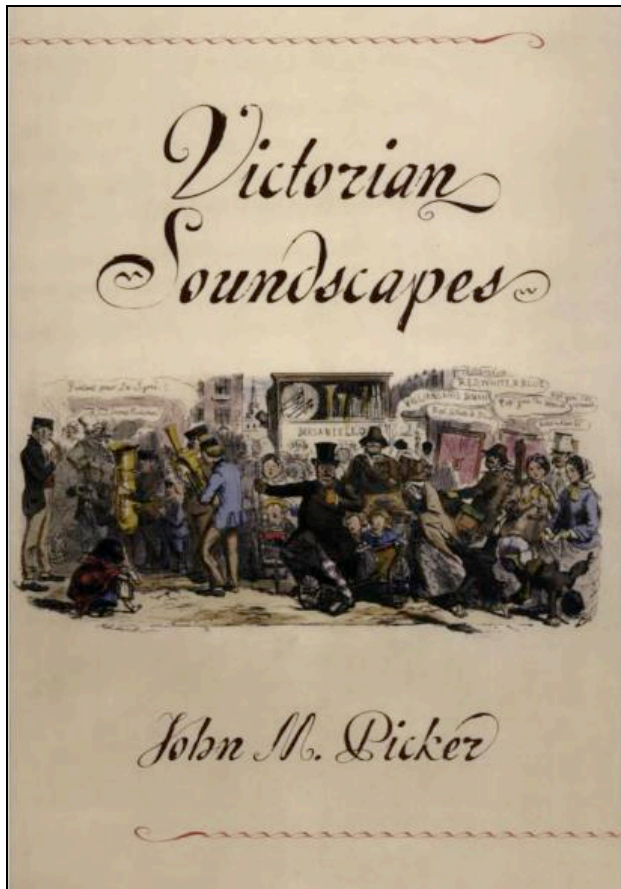


# Sounds in Literary Fiction

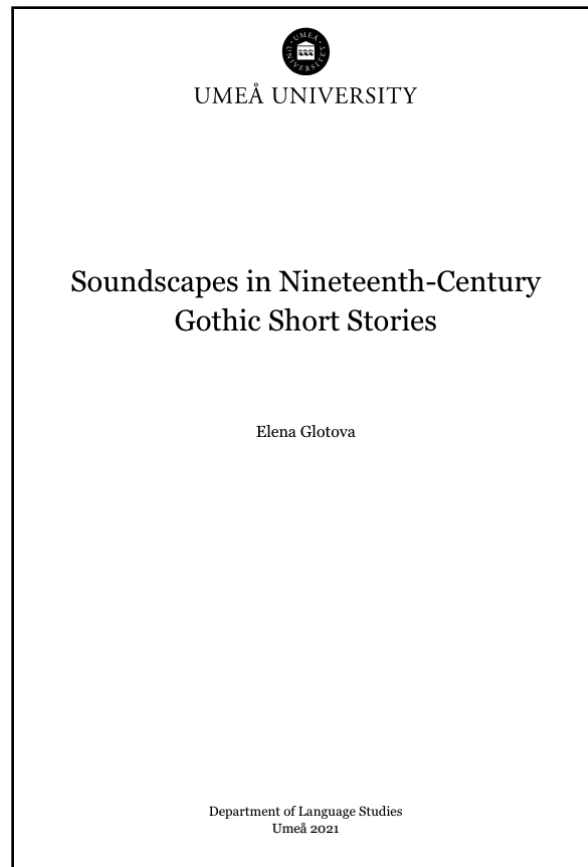
→ Principle of Minimal Departure (Ryan 1991, 2013: 15)

“fictional text [is not limited] to an imitation of reality[, but] texts are free to construct fictional worlds that differ from [actual worlds] [...] [while] imagin[ing] fictional worlds as the closest possible to [actual worlds].

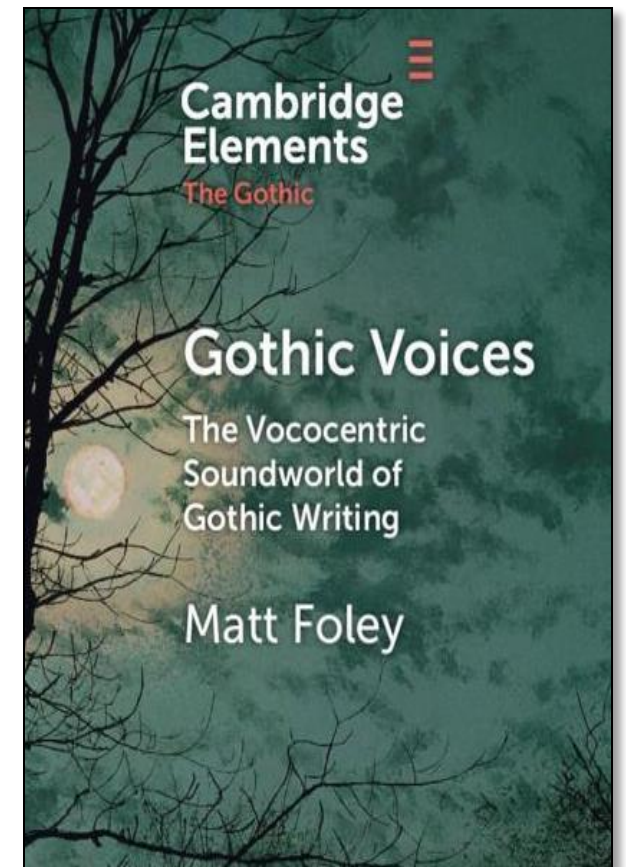
# Research on Sound in Literary Studies



Picker (2003)



Glotova (2021)



Foley (2023)

# Research on Sound in Literary Studies

## Stadt hören

Auditive Wahrnehmung in *Berlin Alexanderplatz* von Alfred Döblin

Hearing the city. Aural perception in *Berlin Alexanderplatz* by Alfred Döblin

Published: 27 February 2017

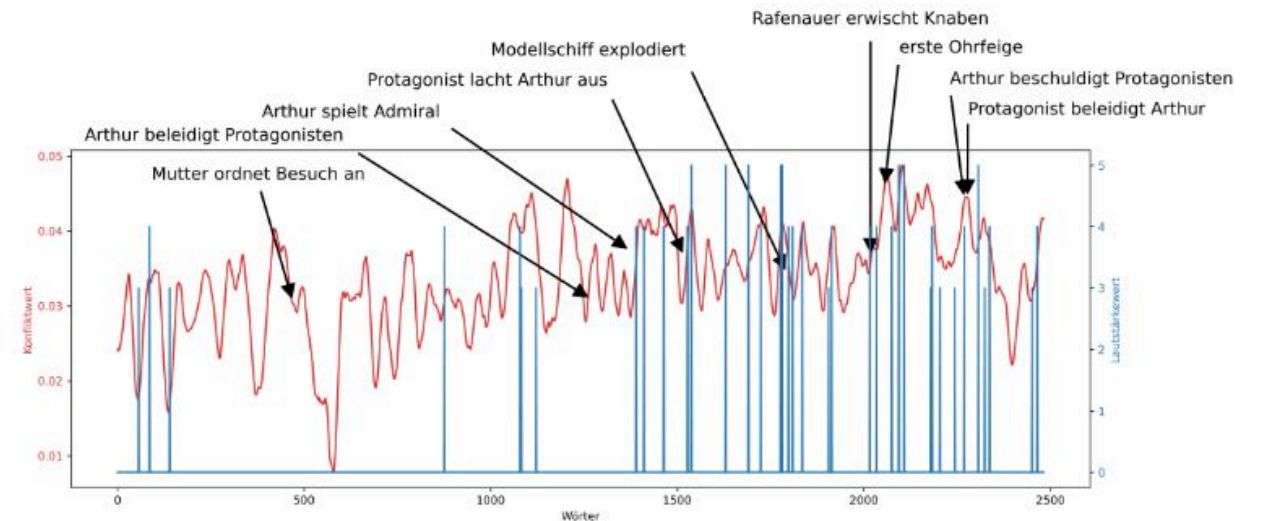
Volume 38, pages 51–67, (2008) [Cite this article](#)



Bernhart ([2008]2017)

## Lautstärke und Konflikt in Realismus und Naturalismus

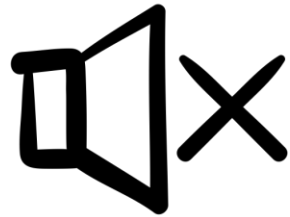
Häußler, Julian<sup>1</sup> ; Guhr, Svenja<sup>1</sup> ; Gius, Evelyn<sup>1</sup>



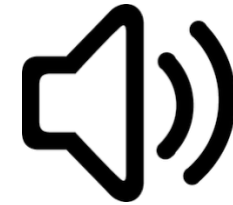
Conflict values (cosine smoothing, window size 40) and sound words + loudness values in *The Noble Boy* (L. Thoma)

Häußler/Guhr/Gius (2024)

# Implicit vs. Explicit Sound



The train enters the station.



The train rattles into the station.

The train <sub>sound</sub> **rattles** into the station.



# From Sound Word to Sound Event

But there was nothing on the back of the door, except the screws and nuts that held the knocker on, so he said, “Pooh, pooh!” and closed it with a bang. The sound resounded through the house like thunder.

# From Sound Word to Sound Event

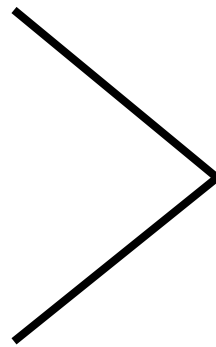
But there was nothing on the back of the door, except the screws and nuts that held the knocker on, so he said, “Pooh, pooh!” and closed it with a bang. The sound resounded through the house like thunder.

## **Sound Words:**

say, bang, sound,  
resound

## **Sound Quality:**

like thunder



## **Sound Events:**

- he said
- closed it with a bang
- The sound resounded through the house like thunder

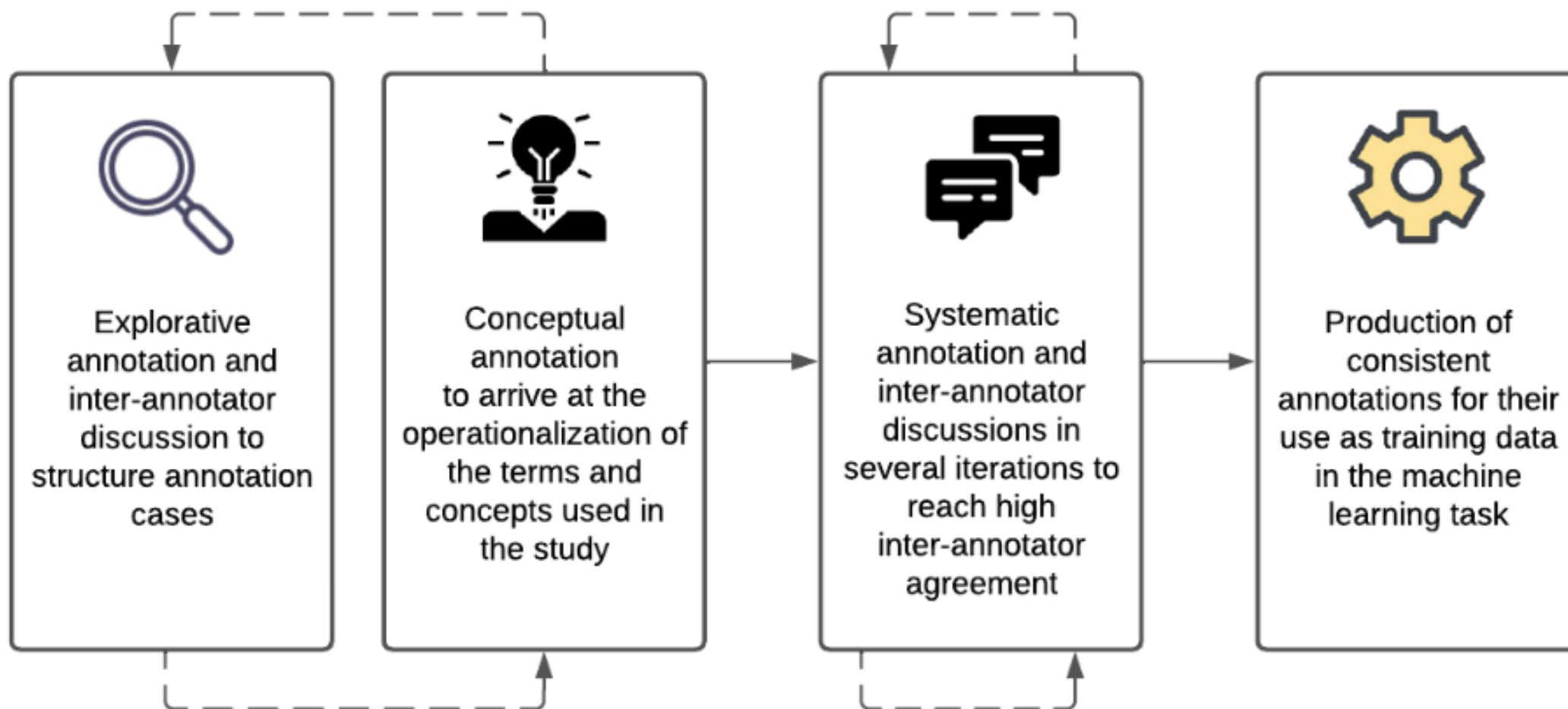
# Fictional Sounds

- Sound events
- With asserted *realis* in the fiction
- Explicitly represented in the narration through sound words (sound-representing content words)
- Carry information about fictional soundscapes
- E.g., ‘voice’, ‘rattling’, ‘saying’, ‘quiet’
- Extendable by sound qualities such as loudness

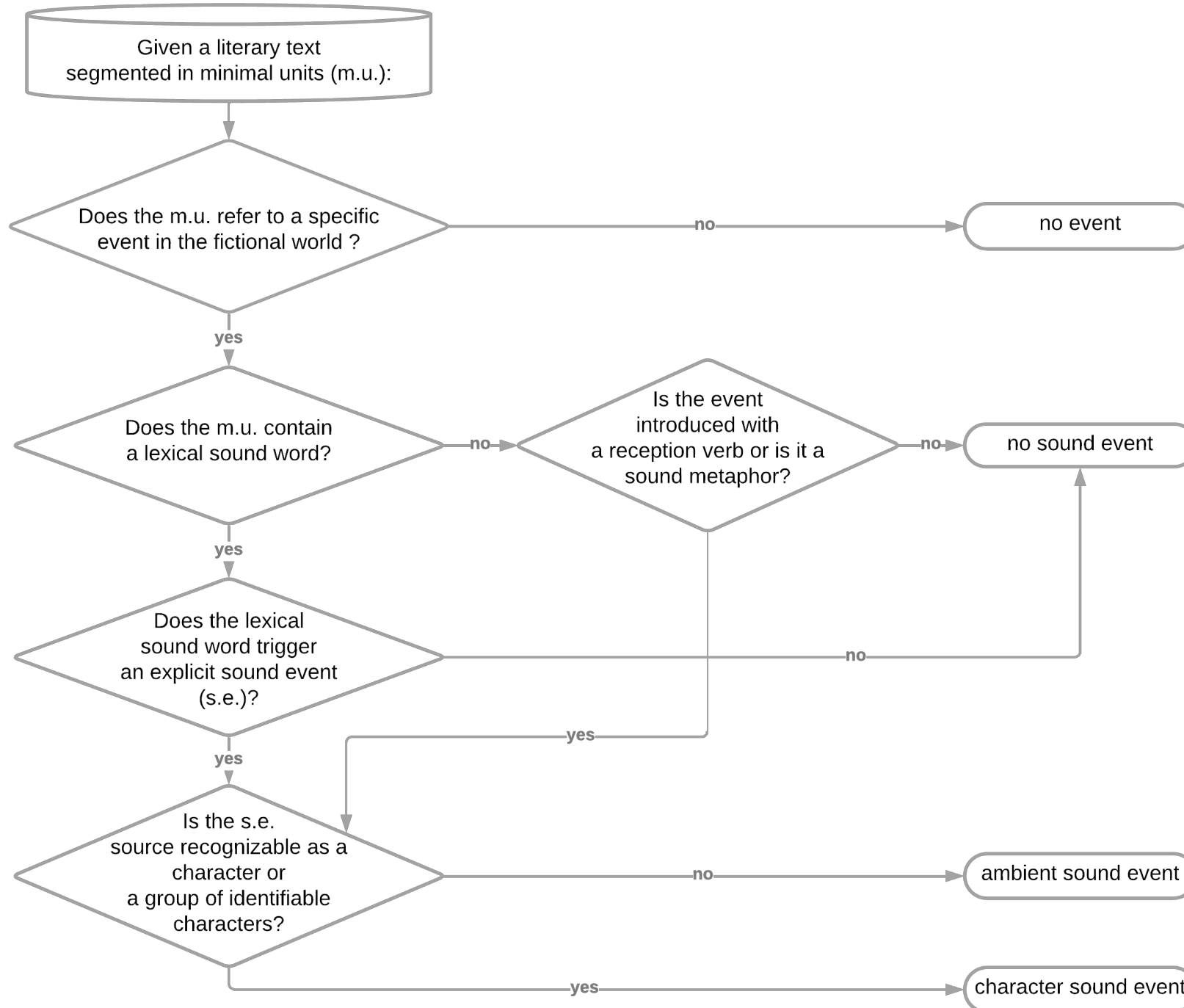
How do we get from the phenomenon to its systematic recognition on the textual surface?



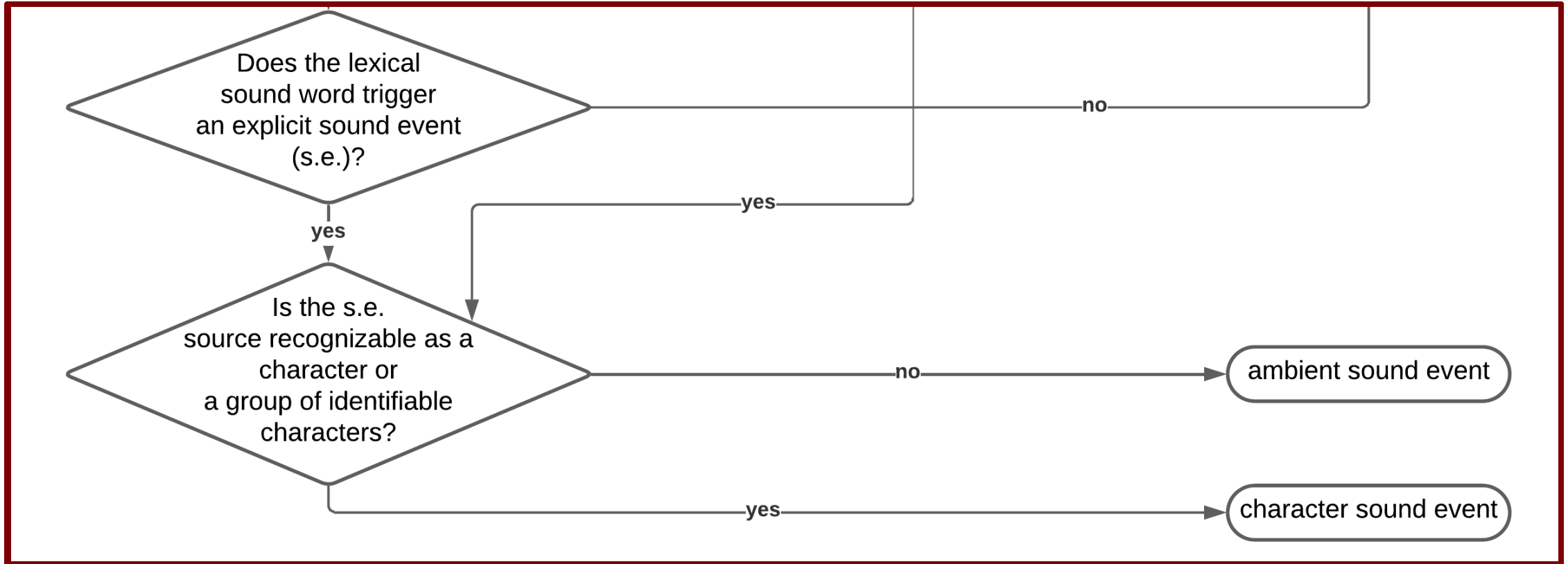
# Workflow



# Annotation of Sound Events



# Annotation of Sound Events



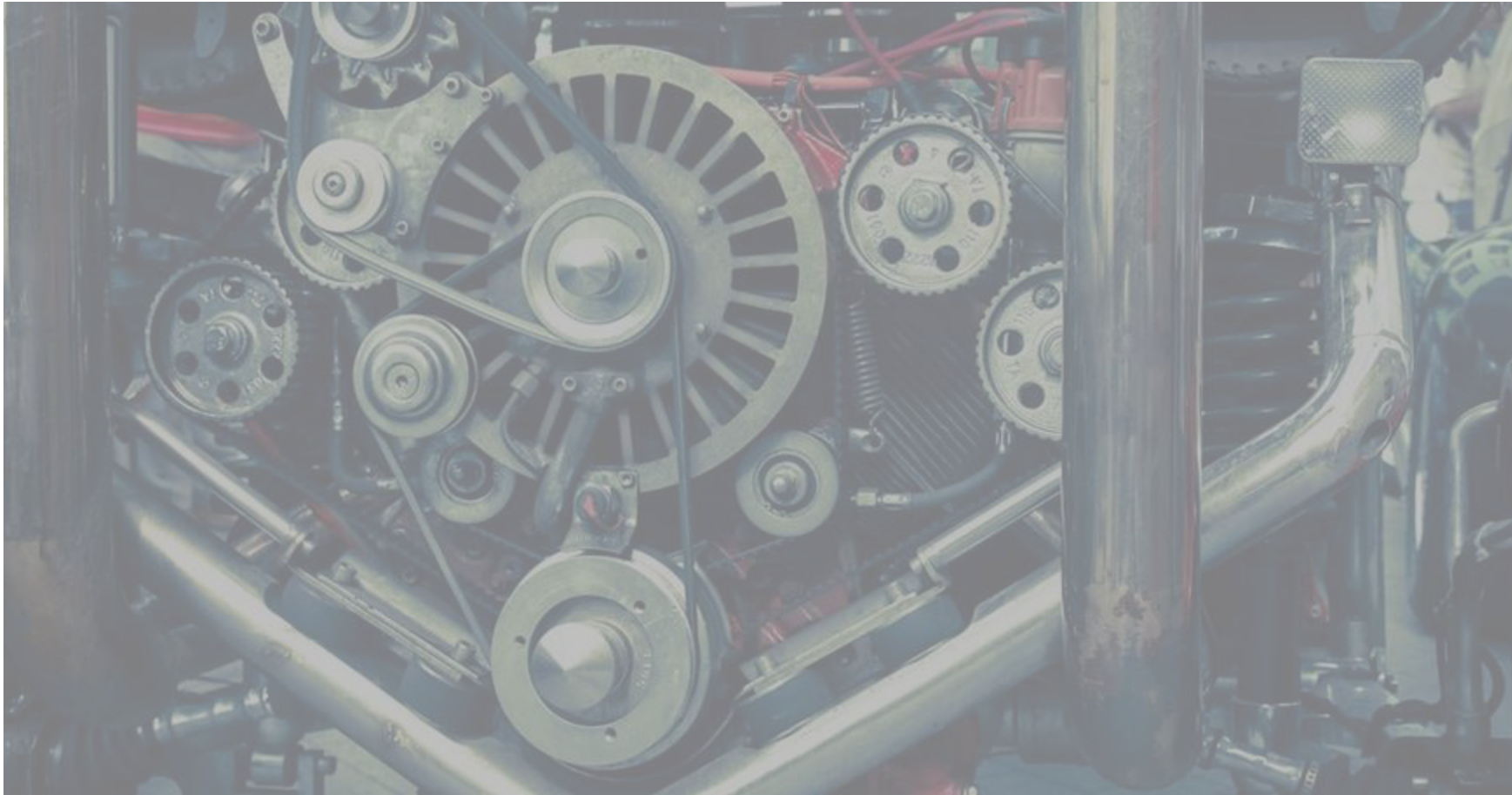
# Annotation of Loudness

S	explicitly no sound	silence ( <i>Schweigen</i> and <i>Stille</i> )
1	very low sound	falling leaves – breathing
2	low sound	ticking of a clock – whispering
3	medium loud sound	singing of a bird – room level conversations
4	loud sound	loudest human-made sound – barking dog
5	very loud sound	car horn – rocket launch

# In Summary...

- Definition of fictional sounds
- Guidelines and decision tree for detecting the sounds
- 65 systematically sound-annotated *theme-d-Prose* texts
- Divided into training (55 texts) and test data (10 texts)
  
- 5 annotated texts (British English):
  - 1 manually annotated (*A Christmas Carol*),
  - 4 machine-translated texts from the annotated German-language corpus

# Two-Step-Automation



# Two-Step-Automation

## 1. Software NEISS TEI Entity Enricher (Zöllner et al. 2021)

- Based on:
  - Implemented pre-trained BERT-language models
  - Transfer-learning algorithm (Kamath 2019)
- Finetuning for classification tasks
- Input: XML-annotated texts



## 2. Dictionary-matching algorithm for loudness level labeling

- key-value pairs, i.e. {'whisper': 2}

# Automation Output

- Annotation in XML TEI:
  - `<character_sound loudness="n">sound event</character_sound>`
  - `<ambient_sound loudness="n">sound event</ambient_sound>`

But there was nothing on the back of the door, except the screws and nuts that held the knocker on, so `<character_sound loudness="3.0">he said</character_sound>`, "Pooh pooh!" and `<ambient_sound loudness="4.0">closed it with a bang</ambient_sound>`. `<ambient_sound loudness="4.0">The sound resounded through the house like thunder</ambient_sound>`.



# Evaluation

sound event  
recognition and  
classification task

	texts	words	Annot.	E-F1 <sub>test(b.e.)</sub>
German <sub>19C</sub>	55	705,623	10,145 <sub>all</sub>	0.70 <sub>28</sub>
US-Eng <sub>20C</sub>	2	48,900	710 <sub>char.</sub>	0.8
UK-Eng <sub>19C</sub>	1+4 <sub>transl.</sub>	47,334	1,046 <sub>all</sub>	0.61 <sub>7</sub>

# Extract of machine-annotated *Edwin Drood*

They all three look towards an old stone gatehouse crossing the Close, with an arched thoroughfare passing beneath it. Through its latticed window, a fire shines out upon the fast-darkening scene, involving in shadow the pendent masses of ivy and creeper covering the building's front.

<ambient\_sound loudness="4.0">As the deep Cathedral-bell strikes the hour</ambient\_sound>, a ripple of wind goes through these at their distance,  
<ambient\_sound loudness="2.5">like a ripple of the solemn sound that hums through tomb and tower, broken niche and defaced statue</ambient\_sound>, in the pile close at hand.

'Is Mr. Jasper's nephew with him?' <character\_sound loudness="3.0">the Dean asks</character\_sound>.

'No, sir,' <character\_sound loudness="3.0">replied the Verger</character\_sound>, 'but expected. There's his own solitary shadow betwixt his two windows--the one looking this way, and the one looking down into the High Street--drawing his own curtains now.'

'Well, well,' <character\_sound loudness="3.0">says the Dean</character\_sound>, <character\_sound loudness="2.5">with a sprightly air of breaking up the little conference</character\_sound>,

'I hope Mr. Jasper's heart may not be too much set upon his nephew. Our affections, however laudable, in this transitory world, should never master us; we should guide them, guide them.

I find I am not disagreeably reminded of my dinner, **by hearing my dinner-bell**. Perhaps, Mr. Crisparkle, you will, before going home, look in on Jasper?'

# Making Sounds Measurable?

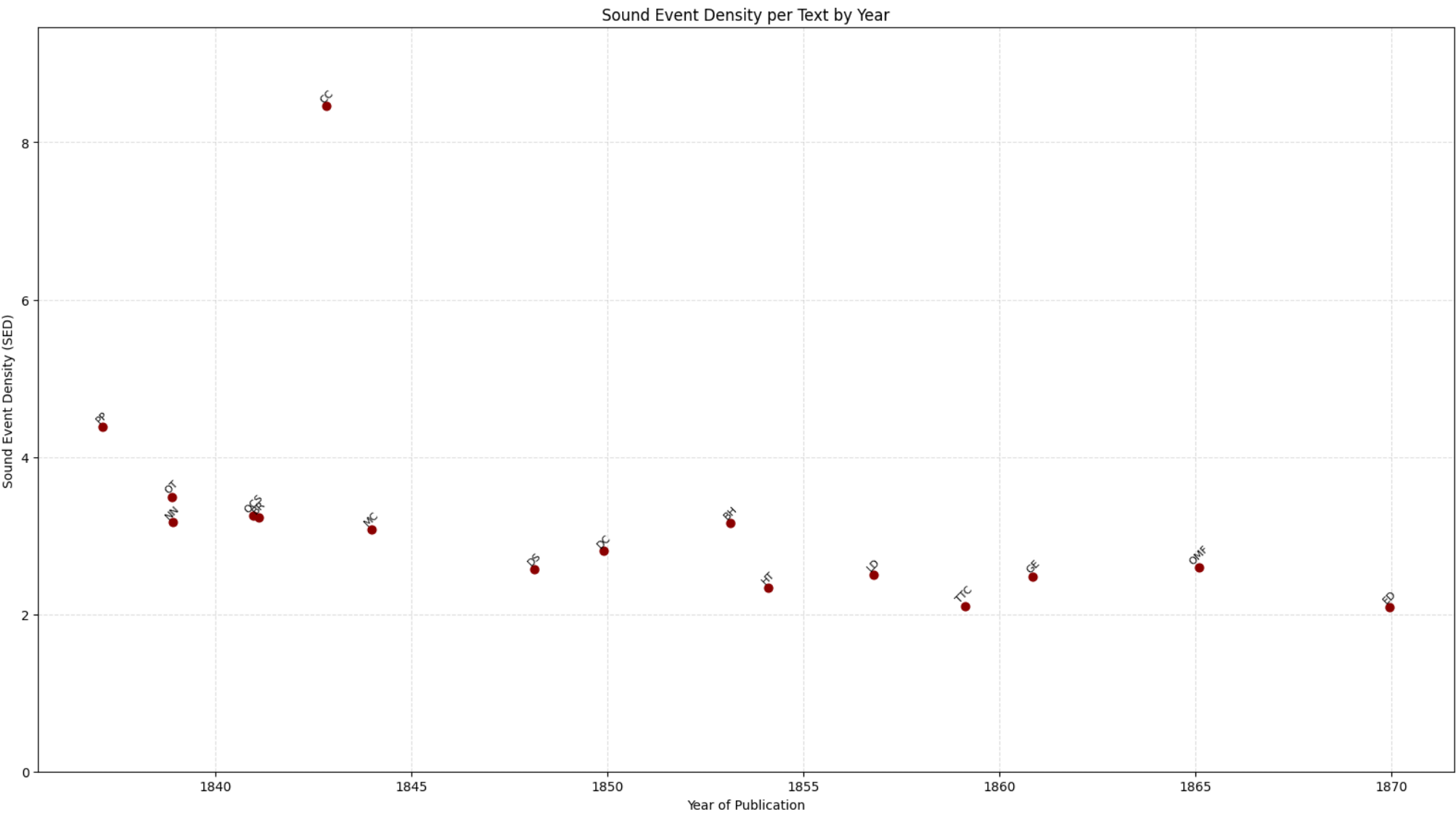
$T$	text
$w$	number of words
$sw$	sound word
$se$	sound event span
$SW_D$	sound word density
$SE_D$	sound event density
$T_{se}$	number of sound events in a text
$T_{pe}$	number of possible events in a text

$$SW_D = \frac{sw}{w} \cdot 100$$

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

(n = 16)

# SE<sub>D</sub> Scores Related to Text Length and Publication Year



Guhr/Algee-Hewitt (2024).  
“What’s that Scary Sound?”  
[10.48694/jcls.3583](https://doi.org/10.48694/jcls.3583).



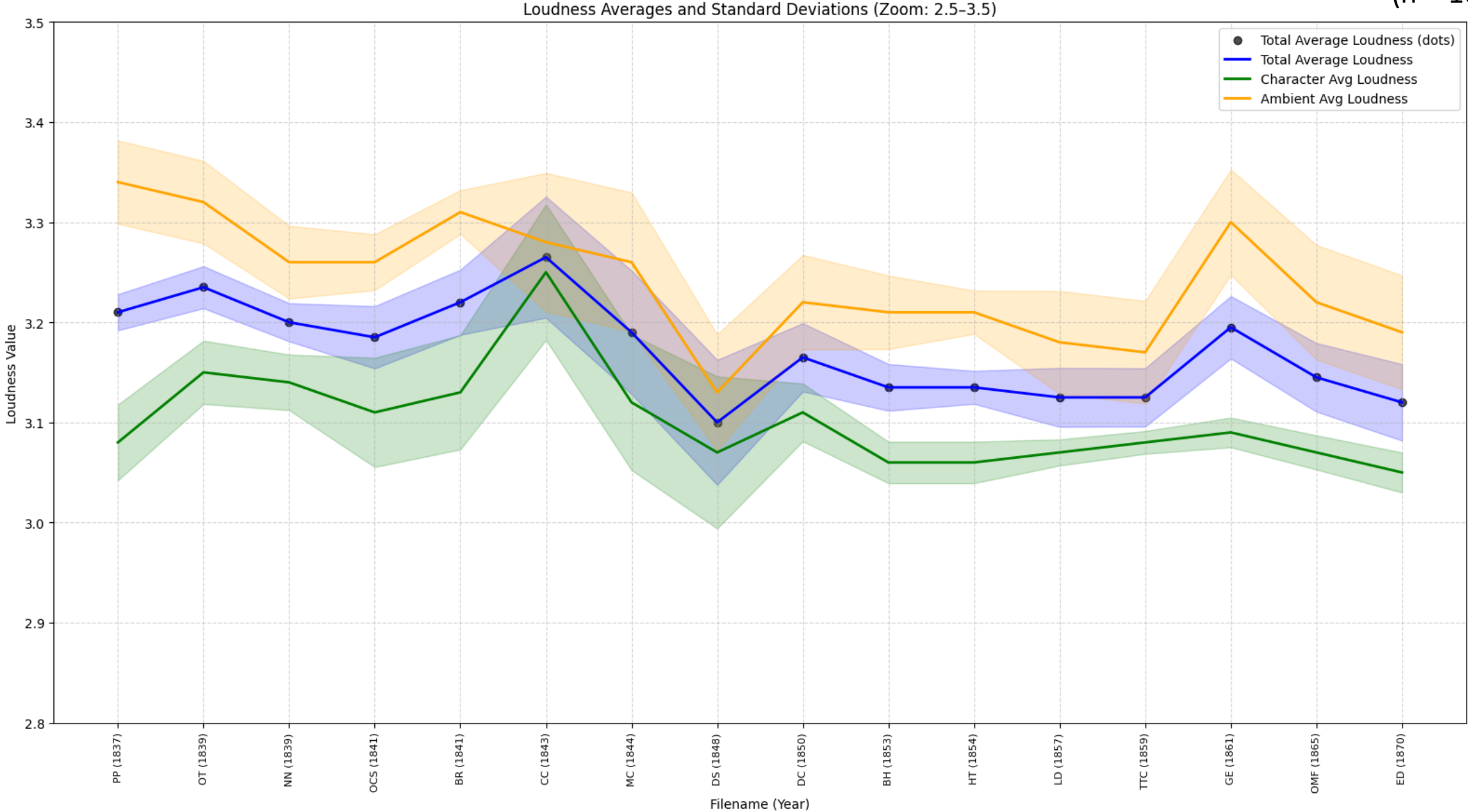
# Making Sounds Measurable?

$l$	loudness level value
$l_{sw}$	loudness level value of a sound word
$l_{se}$	loudness level value of a sound event
$SW_l$	number of loudness level labeled sound words
$SE_l$	number of loudness level labeled sound events
$T_{SE_l}$	number of loudness level labeled sound event spans in a text
$\overline{T_l}$	a text's average loudness level
$\overline{T_{l_C}}$	a text's average loudness level of character sounds
$\overline{T_{l_A}}$	a text's average loudness level of ambient sounds

$$\overline{T_l} = \frac{\sum l_{se}}{SE_l}$$

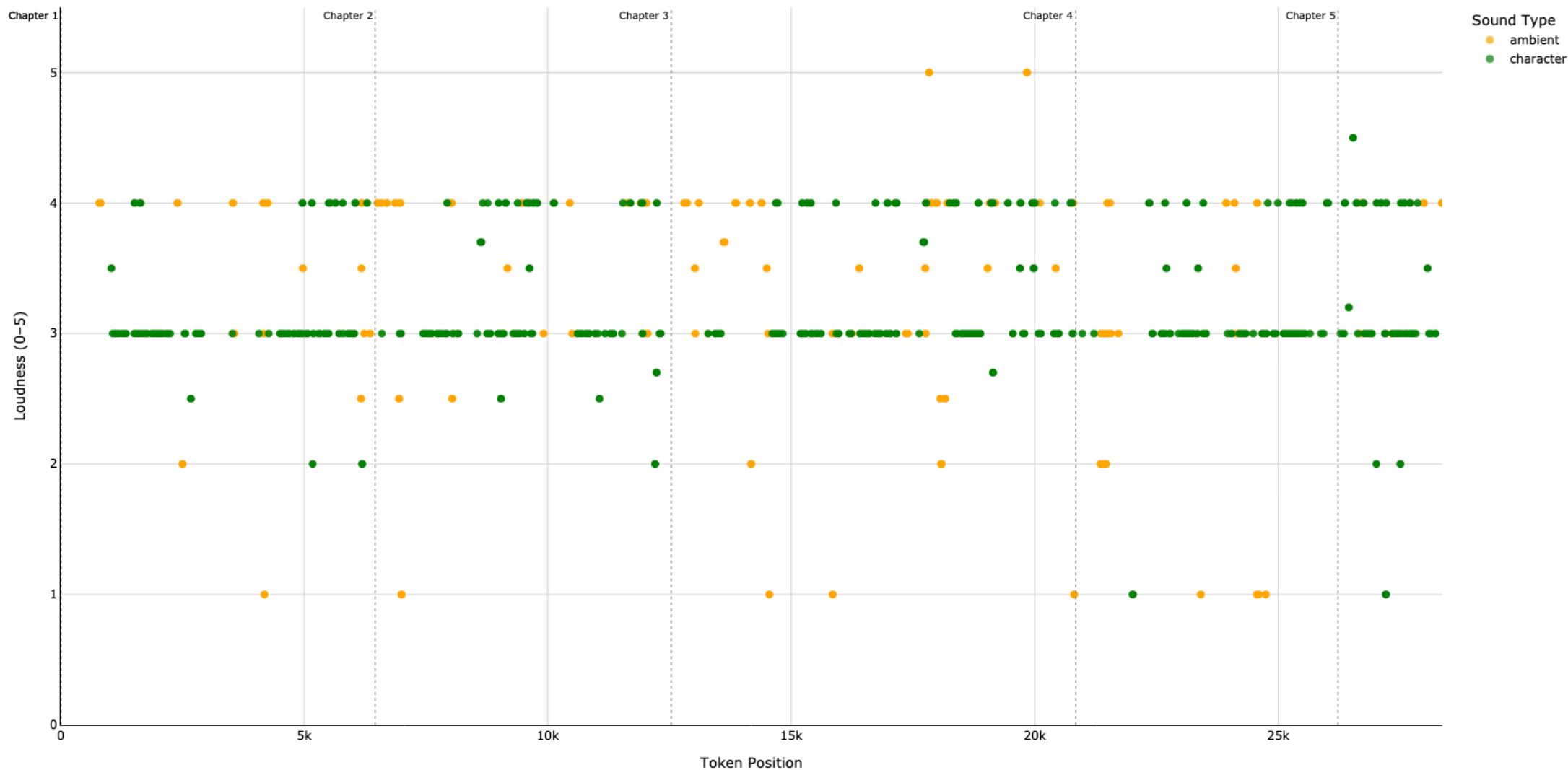
# Loudness Averages and Standard Dev.

(n = 16)



# Sound and Loudness in *A Christmas Carol*

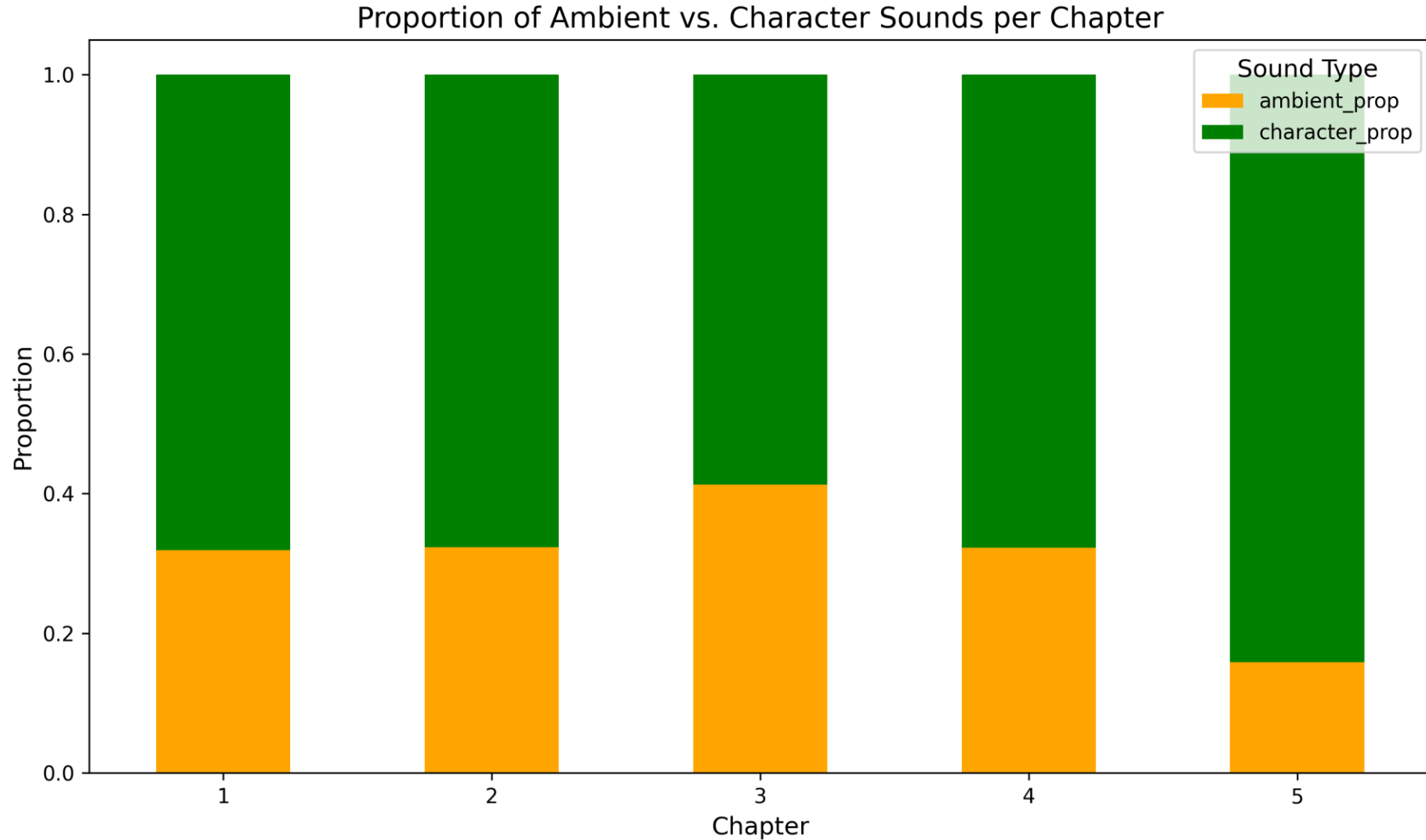
Sound Events in Charles Dickens - A Christmas Carol



[interactive](#)

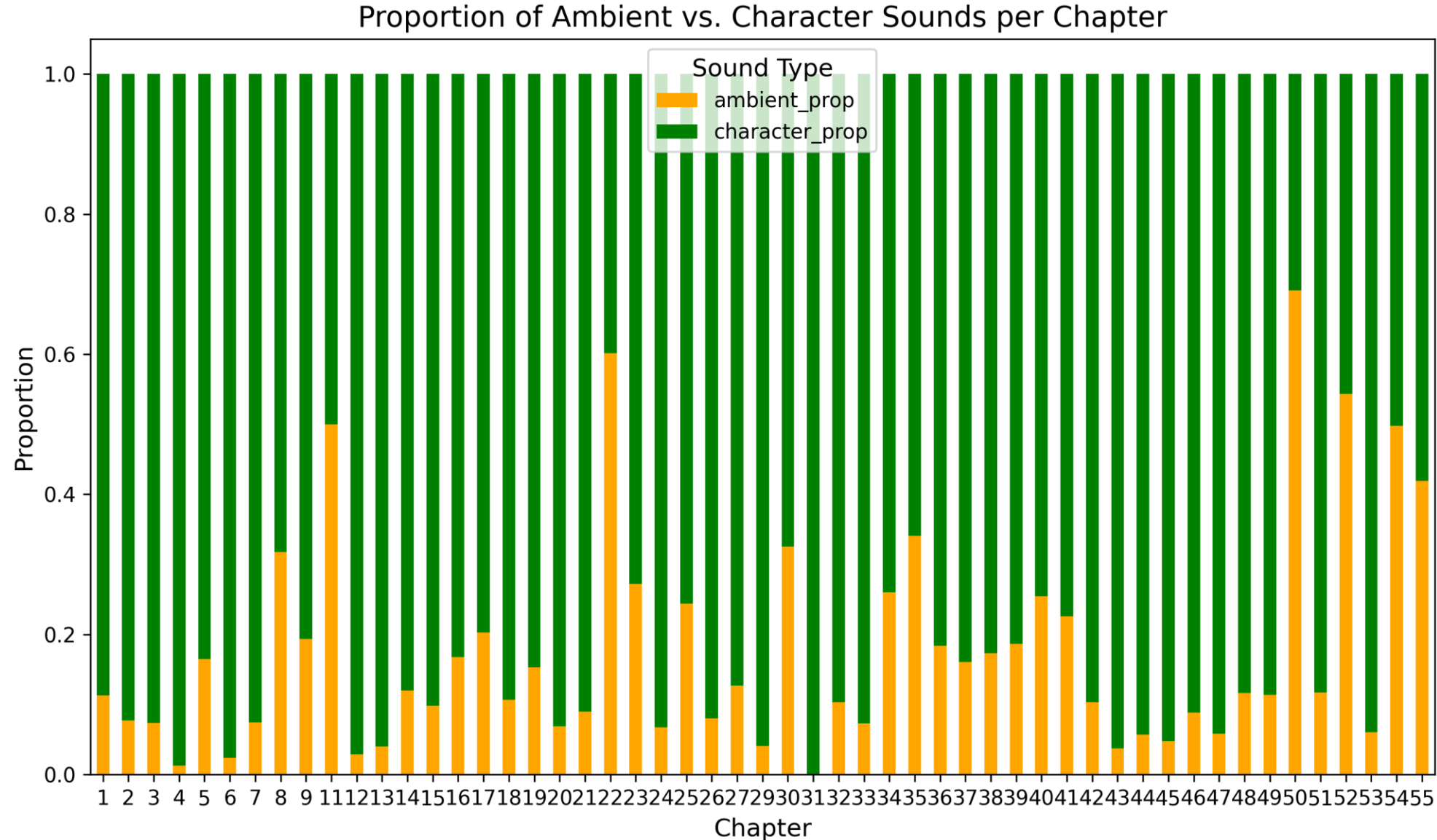


# Sound Class Proportion in *A Christmas Carol*





# Sound Class Proportion in *Oliver Twist*



# Conclusion and Outlook

- Rich potential of fictional sound analysis for scalable reading
- Approach adaptable to further languages – annotations needed
- Annotation augmentation through machine-translation – promising
- Next steps?
  - Add space annotations to the xml files and visualizations using the “Domestic Space Tagger”

see: Guhr et al.: “Making BERT Feel at Home. Modelling Domestic Space in 19th-Century British and Irish Fiction” at [CCLS 2025 in Krakow](#)

- Further classification of sound types: What kind of sounds are depicted in domestic space or other?
- And still ongoing: What about suspense and the detection of important plot elements?

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# Excited for Sound in Fiction?

Find slides, code, further visualizations, and updates on:



[https://github.com/SvenjaGuhr/Literary\\_Soundscapes](https://github.com/SvenjaGuhr/Literary_Soundscapes)

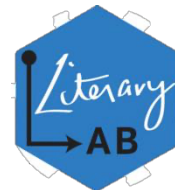
<https://github.com/SvenjaGuhr/Raise-Your-Voice>

Monograph publication planned for summer/fall 2025:

***Raise Your Voice – Character Sound in German-Language Fiction***

Springer/Metzler Series: Digitale Literaturwissenschaft

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