

# The Repetition/Recurrence Analyses Function

Armin Hoenen  
Text Technology Lab  
Goethe University Frankfurt

Slide Compass

- Aim
- History
- OFT
- Measures
- ReAF
  - General Descr.
  - Visual Cues
  - Techn. Backend
- Examples
  - Epics
  - Avestan
  - Language
- Summary

## Aim and Source of the ReAF Visualization

### Object of Visualization: **Verse Text**



- Classification of **Degree of Orality**
- Investigation about **Repetitive Structures that interact with Memorization**

# History of Verse Text Visualization

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1. Script
2. Spaces, Capitalization, Color, Punctuation
3. Line Breaks
4. Lord/Parry – Scientific
5. Foley – Creative
6. ReAF

RELATIVE TIME



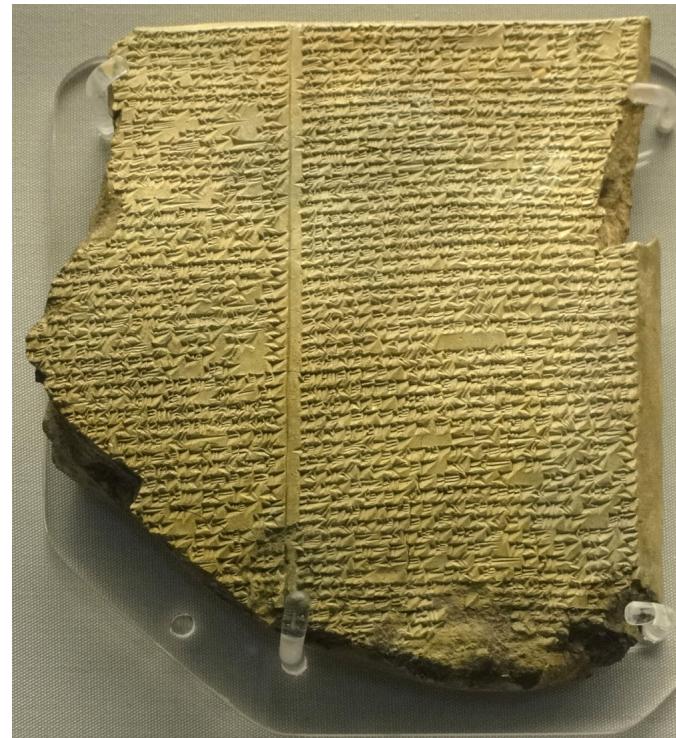
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# Script

## History of Verse Text Visualization

Gilgamesh, 7<sup>th</sup> century B.C., Neo-Assyrian



CHIROGRAPHIC AGE

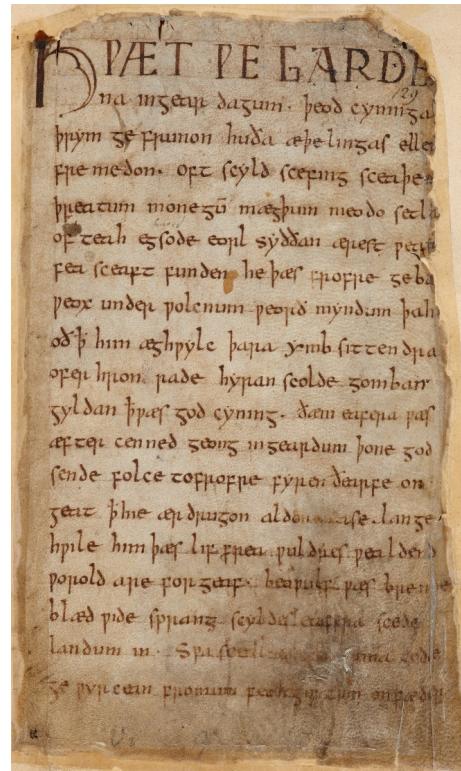
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## Periods

# History of Verse Text Visualization

Beowulf, 10<sup>th</sup> century, West- Saxon



CHIROGRAPHIC AGE

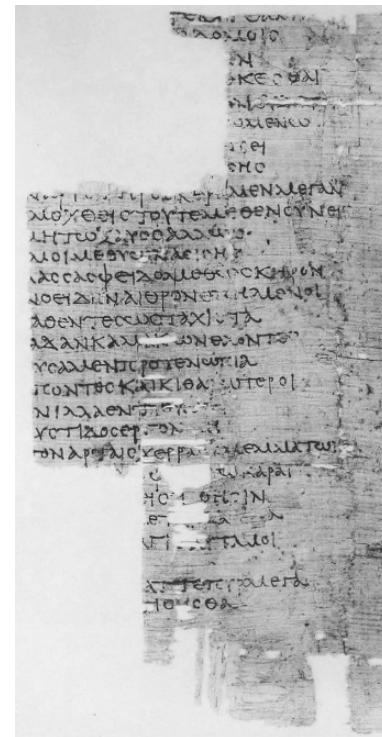
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# Line Breaks

## History of Verse Text Visualization

Alcaeus of Mytilene, 2<sup>nd</sup> century, Ancient Greek



CHIROGRAPHIC AGE

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**Parry  
(1987)**  
**Lord  
(1960)**

## History of Verse Text Visualization

Underlining of Repeated Sequences, Analyses, Degree of Orality

Ανδρά μοι ἔννεπε, Μοῦσα, πολύτροπον, ὅς μάλα πολλὰ  
πλάγχθη, ἐπεὶ Τροίης Ἱερὸν πτολίευθρον ἔπερσε.  
πολλῶν δ' ἀνθρώπων ἵδεν ἄστεα καὶ νόον ἔγνω,  
πολλὰ δ' ὅ γ' ἐν πόντῳ πάθεν ἄλγεα ὃν κατὰ θυμόν,  
ἀρνύμενος ἦν τε ψυχὴν καὶ νόστον ἔταιρων.  
ἀλλ' οὐδ' ᾖς έτάρους ἔρρύσατο ἴμενός περ.  
αὐτῶν γὰρ σφετέρησιν ἀτασθαλίησιν ὅλοντο,  
νήπιοι, οἱ κατὰ βοῦς ‘Υπερίονος ’Ηελίοιο  
ἥσθιον. αὐτὰρ ὁ τοῖσιν ἀφείλετο νόστιμον ῆμαρ.  
τῶν ὀμόθεν γε, θεά, θύγατερ Διός, εἰπὲ καὶ ἡμῖν.

PRINT PAGE

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## History of Verse Text Visualization

### Foley (2002)

#### Poets Individual Renderings

Tis nothing more but just a test,  
Though poets illusTRAtion say.  
Important just is reading best,  
Where **bold face**, size and **color** play

PRINT AGE

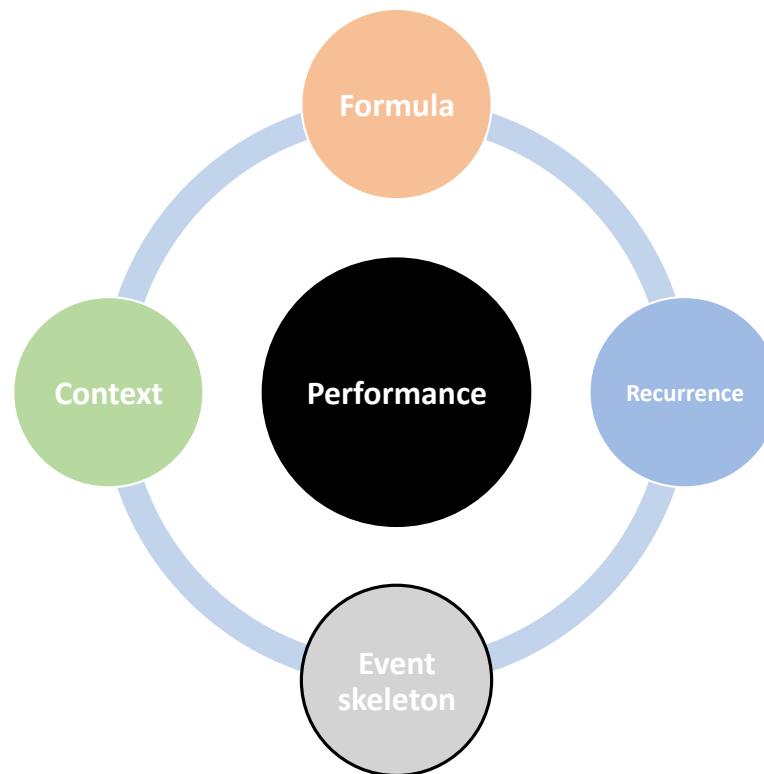
# Oral Formulaic Theory

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Time, Audience,  
Goals, Motivation

Narrative Elements  
and Patterns



**Meta Language  
(Epithets)**

**Memorization  
Pressure**

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## Measuring Recurrence

- 1. Type-Token Ratio (TTR):  $ttr = \frac{\text{number of types}}{\text{number of tokens}}$
  2. Versetype–Verse Ratio (VVR):  $vvr = \frac{\text{number of diff.verses}}{\text{number of verses}}$
  3. Positional Faithfulness (PF):  $pf = \frac{\text{number of faithful words}}{\text{number of repeated words}}$

$$ttr, vvr, pf \leq 1$$

\*Compression Ratio

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## Recurrence (Repetition) Analyses Function

### Objects

- Verse Text (Epics)
- Recurring Elements

### Type

- Dynamic Heatmap with Details
- Browser

### Users

- Verse text scholars
- Classicists, Anthropologists

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## Recurrence (Repetition) Analyses Function

- Close Reading ⚡ Overview
  - Lord (1960) for 40.000 lines: ***no overview***
  - Heatmap on Text: ***no close reading***
- Mazza (2009)

*"It is necessary for a picture to give the reader as much data as can be processed quickly, using as little space as possible."*
- Shneiderman (1996)

*"...overview first, zoom and filter, then details on demand..."*
- Heatmap is Overview ☀ Close Reading is Detail

## Recurrence (Repetition) Analyses Function

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- Table with **one cell** representing **one verse**
- Enabling **expansion of cells for close reading**
- Parametricized dynamic coloring
- Platform-independent

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## Examples

Class	Texts
Already classified as oral*	Odyssey, Iliad, Beowulf, Kalevala, Chanson de Roland, Psalms, Rigveda
disputed	Shahname, Parzival, Heliand
Born-written	Faust, MacBeth, Knight With Tiger Skin, Divina Comedia

\* no such classification is completely uncontroversial (lest anthropological primary records)

- For Illustration, Odyssey, text from TITUS website:

<file:///C:/Users/Armin/workspace/ReAF/outputParamIterII/ReAOdysseeTitusPr.html>

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## Examples

Rgveda

C1	3	2	2	2	3	4	3	3	2
C2	3	2	3	3	3	3	4	4	
C3	3	1	1	1	3	3	3	3	3
C4	3	0	2	2	3	4	3	3	3
C5	3	3	3	3	3	5	3	3	2
C6	3	2	2	2	3	4	4	4	
C7	1	1	2	1	1	3	3	3	2
C8	3	3	2	2	3	2	3	3	4
C9	3	1	2	1	3	3	3	3	2
C10	3	0	2	5	1	4	4	3	1

Kalevala

C1	1	5	2	1	3	1	2	2	1	3
C2	1	2	3	2	0	4	3	5	3	2
C3	1	3	5	2	6	3	8	5	1	2
C4	1	4	3	2	2	2	4	5	4	6
C5	1	3	3	4	2	3	5	2	4	3
C6	1	3	5	4	6	2	3	4	3	5
C7	1	3	1	3	6	2	2	2	3	5
C8	1	6	5	0	3	1	2	2	2	3
C9	1	4	2	3	1	4	2	5	1	2
C10	1	4	5	4	5	3	2	4	3	3

Heliand

I	1	2	3	1	2	1	1	4	2	1	0
II	4	3	3	2	1	4	1	2	3	3	1
III	3	3	3	1	3	3	2	3	1	3	3
IV	5	4	2	2	1	1	3	2	2	1	3
V	2	1	3	0	1	2	2	1	0	3	3
VI	4	1	1	4	4	1	2	2	2	3	2
VII	2	1	4	2	3	2	3	3	2	3	2
VIII	4	2	2	2	3	2	1	4	2	1	1
IX	5	2	2	2	2	2	3	2	1	1	2
X	4	3	2	1	2	2	3	1	3	2	0

Vepkhistqaosani

C1	2	1	2	3	2	2	1	2	2	1
C2	3	1	2	2	4	2	3	3	3	2
C3	2	1	2	2	3	2	2	2	2	1
C4	2	4	1	2	4	2	2	2	3	2
C5	3	2	2	3	2	3	2	3	3	2
C6	2	3	2	2	3	2	3	2	4	3
C7	2	1	3	2	2	1	2	4	1	1
C8	1	2	1	3	3	2	2	3	2	3
C9	3	2	2	4	2	2	2	3	1	
C10	3	2	2	2	2	3	4	2	1	

Divina Comedia

I	3	3	3	3	3	3	3	3	3	3
II	2	4	3	2	4	4	2	4	3	3
III	4	4	4	2	2	3	3	2	2	
IV	2	3	2	2	2	3	4	3	2	
V	2	3	4	2	2	2	2	3	3	
VI	4	3	3	2	3	4	3	2	3	
VII	0	3	3	2	3	2	5	3	3	
VIII	1	5	5	3	3	2	4	3	4	
IX	3	3	3	2	2	3	2	4	2	
X	3	5	4	3	3	3	2	3	4	

VVR

0.85

0.95

0.97

1

1



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## Examples

- Individualisation by use of *different visual mapping*:
  - Display cells with Prayers
  - Display Gaps in Manuscript
  - Spell out Abbreviated Text („to be repeated 3 times“)
  - Display cells with Middle Persian Insertions
  - Display ReAF based on Lemmatic Repetition (Lexicon Plug-in)
    - Cells with Complete Lemmatical but no Verbatim Repetition
  - Display Alliteration/Rhyme
  - Display Word Length Repetition, ...

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# Examples

This is the **prototype of the repetition analyses function**  
**manuscript J2.**

**black** = material loss of manuscript J2  
**grey** = text which has to be uttered but is abbreviated in the manuscript as e.g.: **to be spoken two times**  
**white** = unique (not repeated) verselines  
**red** = exactly repeated verselines  
**green** = Middle Persian insertions  
**blue** = Jumeaux

Numbers on the fields denote the strophes.  
 Upon **doubleclick** the cells content will expand and reveal the text as well as the places where this verseline is repeated (cl  
 A subsequent **doubleclick** closes the cell again.  
 Upon **rightclick** all verselines resp. cells, which read the same are highlighted in **blue**.  
 You can zoom in and zoom out and return to the base colors by reload.

		Reset	Zoom-Out	Zoom-IN
Y	0			
Y	1			
Y	2	MP	MP	MP
Y	3	MP	MP	MP
Y	4	MP	MP	MP
Y	5	MP	MP	MP
Y	6	MP	MP	MP
Y	7	MP	MP	MP
Y	8	MP	Y27_14	MP
Y	9			

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### Cell = Sentence

### Counts

### Summing up

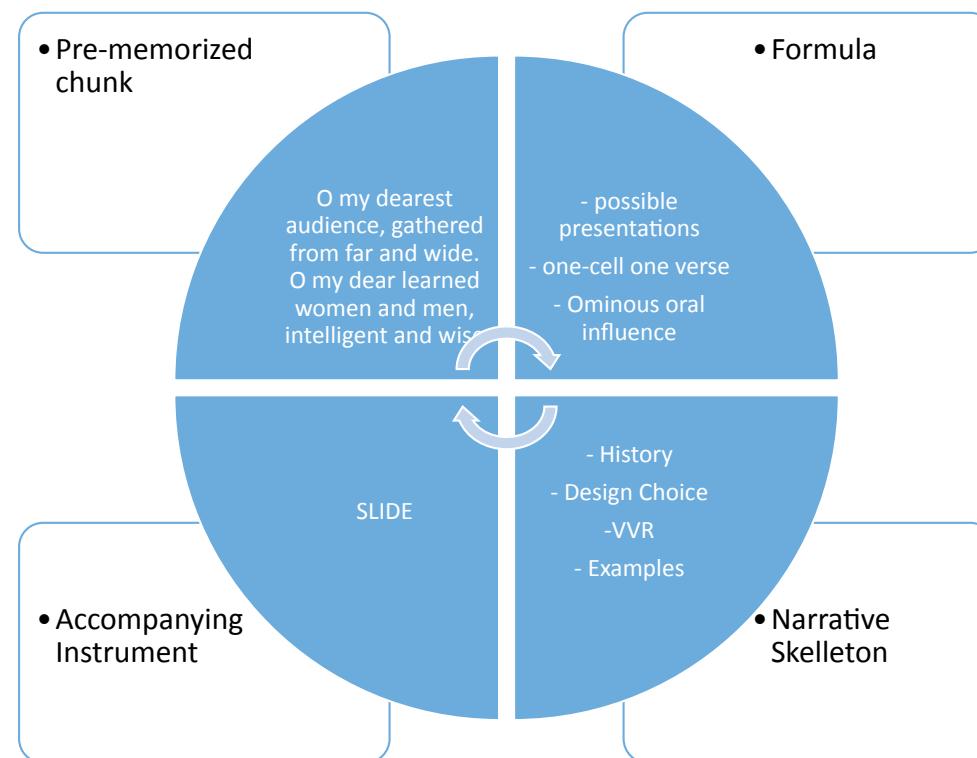
## Examples

	Reset	Name only	RefTerms only	Adjectives only	Pronouns only
NAME=green; REFERENCETERM=yellow; ADJECTIVAL=blue; PRONOUN=red					
Introduction	01	01	01	00	
GEOGRAPHIE	02	00	00	00	00
Klima	00	00	01	00	00
BEVÖLKERUNG	00	00			
Demographie	00	00	00	01	
Völker	00	00	00	00	00
Sprachen	00	00	00	00	
Religion	00	00	01	00	
SOZIALE LAGE	01	00	00	00	00
Bildungswesen	00	00	00	00	
Gesundheitswesen	00	00	00	00	00
GESCHICHTE	01	01	00	00	
Kolonialisierung	01	01	00	02	01
Bürgerkrieg	01	00	00	00	00
Jüngere Geschichte[Bearbeiten]	02	00	01	01	00
POLITIK					
Politisches System	01	00	00	01	00
Rechtssystem	01	00	00	00	
Menschenrechte	01	00	01	00	00
ADMINISTRATIVE GLIEDERUNG	01	00			
WIRTSCHAFT	00	01	00	01	
Landwirtschaft	00	00	00	00	00
Rohstoffe	01	00	00	00	01
Staatshaushalt	00	00	01	00	
Infrastruktur[Bearbeiten]	00	00	00	00	00
KULTUR					
Medien	00	00	00	00	00
<b>SUM</b>	15	4	6	4	2
	4	1	0	0	0
	1	1	1	1	0
	2	0	2	0	2
	0	0	0	0	0

# Summary (Oral Style)

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## References

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THANK YOU VERY MUCH FOR YOUR ATTENTION!