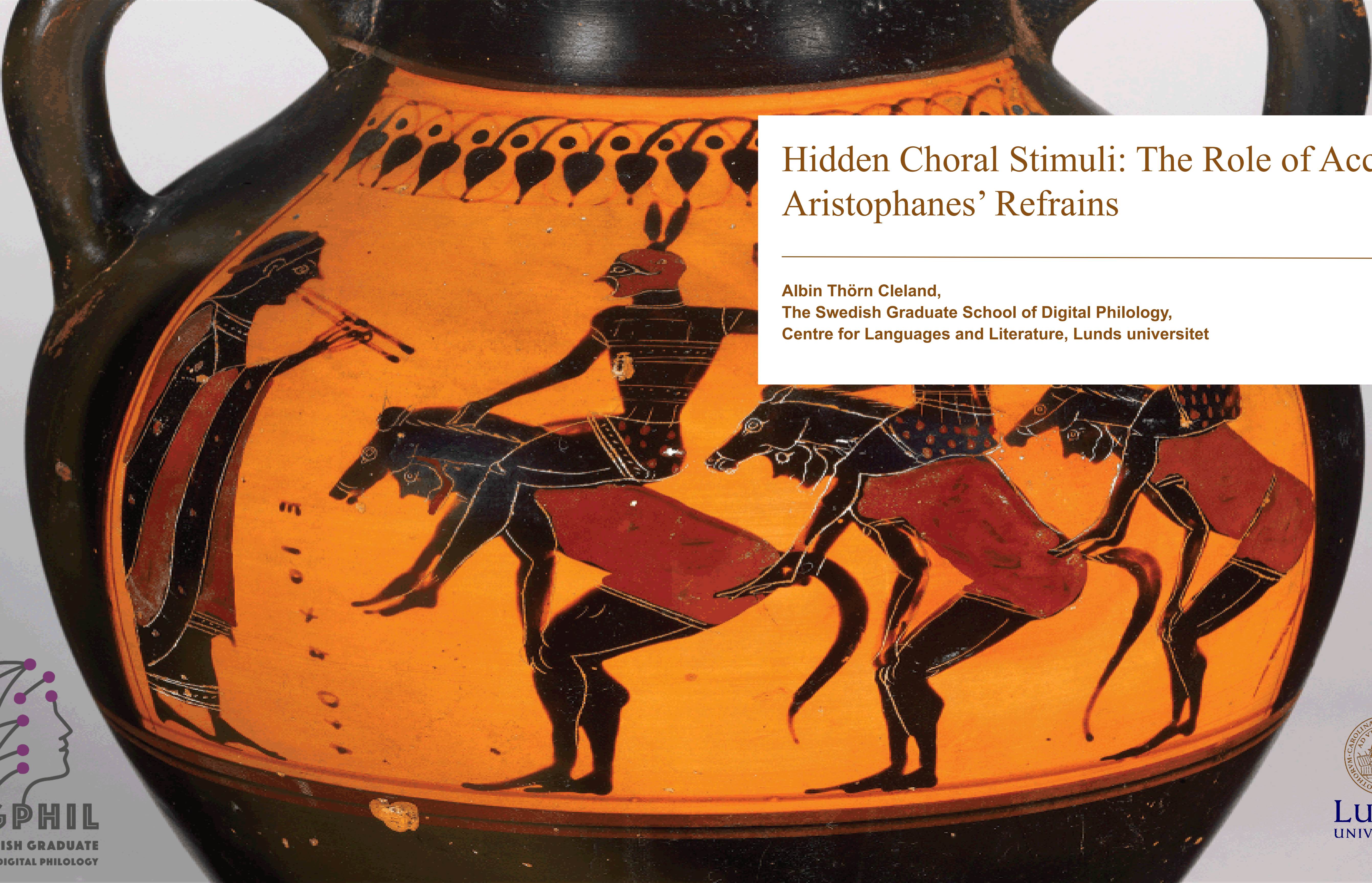


Hidden Choral Stimuli: The Role of Accent in Aristophanes' Refrains

Albin Thörn Cleland,
The Swedish Graduate School of Digital Philology,
Centre for Languages and Literature, Lunds universitet

DIGPHIL
THE SWEDISH GRADUATE SCHOOL OF DIGITAL PHILOLOGY

LUNDS UNIVERSITET

Wahlström in the closet: a summary

- **Erik Wahlström** (Helsinki 1970)
  - published master thesis *Accentual responsion in Greek strophic poetry*
  - coins "accentual responsion" (as far as I know)
  - His inspired hypotheses: "**there did, in fact, exist an accentual responsion**, though of a much freer kind than the metrical responsion": "If all the stanzas of a poem [...] are written under each other so that identical places in the metrical scheme coincide and the number of accents at each particular point is observed, **the accents can be seen to concentrate on certain points and avoid others**. This phenomenon is **especially noticeable at the ends of verses**." (p. 5, 21)

LUNDS UNIVERSITET

Wahlström in the closet: a summary

- **Erik Wahlström** (Helsinki 1970)
  - Criticized in reviews for lack of proper statistical method.
  - Shortcomings include:
    - Small sample size: only considers five songs (although many strophes, since he considers the longest extant song, Pindar's fourth Pythian ode)
    - Null baseline is prose (Thucydides, cf. p. 18f) instead of non-responding verse
    - No significance test yet baselessly claims results "cannot be due to chance"
    - Never calculates **(total nr of responding accents) / (total nr of accents)**
    - Instead he calculates **average nr of accents per syllable** and arbitrarily considers values regularly above or below that to be "manifestly not distributed according to chance", as if Greek had no restrictions on accent placement!
  - Thus his groundbreaking hypothesis mostly ignored for half a century
  - W. was clearly a prodigy, but never went on to graduate studies. From biographical statement: "As a kid I wanted to become professor of Greek. **But that didn't go as planned**" ("*Som liten ville jag bli professor i grekiska. Men det gick snett.*")
  - The **Wahlström hypotheses** deserve better!

LUNDS UNIVERSITET

Wahlström in the closet: a summary

- **Alejandro Abritta** (2015, 2018, 2019):
  - First quantitative **proof that accents were regulated** in Homer's *stichic* verse.
  - Uses a ***phonological* theory** of Greek accent, rather than merely orthographical (the so-called *barys* accent—we will come back to it!)
  - Motivating, but does not directly transfer to the refrains of *strophic lyric*.

LUNDS UNIVERSITET

Wahlström in the closet: a summary

- **Anna Conser** (2020, 2021):
  - First treatment of the Wahlström hypothesis with **proper statistical method**
    - Uses chi-square test against **verse null-hypothesis baseline**
  - Compares the orthographic metric with **an *operationalization* of the *melodic* metric** Wahlström had hinted at when he wrote:
    - “An exhaustive accentual analysis of any strophic poem would entail constructing a complete hypothetical melody” (Wahlström, p. 11)
  - Ingeniously realizes no need for *constructing* melodies: *existence* of melodies is proved through a non-contradiction or **compatibility metric** of abstract melodic contour
  - Proves a **linear increase in melodic compatibility over the course of Aeschylus’ career**
  - Limitations:
    - Lyric in **tragic drama only**
    - **No polystrophic songs** with lots of refrains, which was Wahlström’s main interest!
    - **No metric based on the phonological theory** used by Abritta
    - The verse null **baseline, although verse, is not *lyric***, but iambic trimeter from dialogue ”recitative”
      - Not optimal as comparison, since iambic trimeter is less constrained than lyric meters

Wahlström in the closet: a summary

- Lessons for us:
  - We don’t have to only count orthographical accents! Let the second of our metrics use the **phonological theory** used by Abritta
  - Let the third one use the **melodic theory** of Conser, but:
    - Use Aristophanic **comedy** as corpus instead of tragedy to extend the field
    - Modify Conser’s metric to allow for **polystrophy** (of which there are 6 examples in Aristophanes, 3- and 4-strophe)
    - More bespoke **baselines**:
      - Random groups of **lyric** tetrameters instead of only dialogue ia. trimeters
      - **Polystrophic** versions
      - This will have two effects:
        - Lyric lines are more regulated, hence test will be **tougher** to pass and a significant result more robust
        - All responding phenomena plummet with more strophes, hence using baselines that match the tested corpus in number of strophes will make the significance test much fairer for polystrophic songs

LUNDS UNIVERSITET

New specific quantitative hypotheses

- We can now formulate the following operationalizable hypotheses:
  - **Wahlström's general hypothesis:** accent position is regulated in Greek lyric refrains
    - Operationalized: metrics of orthographic accent response, phonological accent response and melodic compatibility are significantly larger on Aristophanes' songs than on baselines
  - **Conser-style hypothesis:** there is a significant **linear diachronic development** of accentual or melodic response across Aristophanes' career, like that found for Aeschylus.
  - **Wahlström's specific hypothesis:** line end is especially regulated

LUNDS UNIVERSITET

Metric 1: Orthographic accent

- Based on “naive” counting of accent signs (like in Wahlström)
- Grave accent (`) is statistically insignificant, so we only count **acutes** (´) and **circumflexes** (˜)
- Definition is the following ratio, where n = nr of strophes:

$$M_1 = \frac{\text{n * (Nr of sets of responding acutes/circumflexes)}}{\text{Total nr of acutes/circumflexes in all strophes}}$$

LUNDS UNIVERSITET

Example of orthographic accent response in the *parodos* (entry) of the Clouds

v.	**Strophe**	**Antistrophe**	**Scansion (responding accents marked)**	**Metre**
1	ἀέναοι Νεφέλαι,	παρθένοι ὀμβροφόροι,	– ⏑(A)⏑ – ⏑⏑(A) –	D (hemiepes)
2	ἀρθῶμεν φανεραὶ δροσερὰν φύσιν εὐάγητον	ἔλθωμεν λιπαρὰν χθόνα Παλλάδος, εὔανδρον γᾶν	– – – ⏑⏑ – ⏑⏑ – ⏑(A)⏑ – – – –	hexameter
3	πατρὸς ἀπ' Ὠκεανοῦ βαρυαχέος	Κέκροπος ὀψόμεναι πολυήρατον·	– ⏑⏑ – ⏑⏑ – ⏑⏑ – ⏑⏑	4 da
...				
9	μαρμαρέαισιν αὐγαῖς.	παντοδαπαῖσιν ὥραις,	– ⏑⏑ – ⏑ – –	aristophanean
10	ἀλλ' ἀποσεισάμεναι νέφος ὄμβριον	ἦρί τ' ἐπερχομένῳ Βρομία χάρις	– ⏑⏑ – ⏑⏑ – ⏑⏑ – ⏑⏑	4 da
11	ἀθανάτας ἰδέας ἐπιδώμεθα	εὐκελάδων τε χορῶν ἐρεθίσματα	– ⏑⏑(A) – ⏑⏑ – ⏑⏑ –(A) ⏑⏑	4 da
12	τηλεσκόπῳ ὄμματι γαῖαν.	καὶ μοῦσα βαρύβρομος αὐλῶν.	– – ⏑⏑ –(A) ⏑⏑ – –	paroemiac

Green (respon.) accents: 6 * 2 strophes = 12
Σ green and red: 12 + 29 = 41
Accentual response metric: 12/41 = **0.29**

LUNDS UNIVERSITET

Preparation for Metric 2: Barys Accent

- It is by now well-established and relatively uncontroversial that the Greek pitch accent was **accompanied by stress**.*
- Stress was inversely correlated with pitch height and falls on syllables where the tone contour ("contonation") lands. This means the following two types of syllable are stressed:
  - syllable with **circumflex**, e.g. οῦ in λυποῦ
  - **long** syllable ***following*** **a syllable with an acute**, e.g. ω in λύω
- With David (2006) we call this stress accent *barys* (βαρύς), because this Greek word meant **both "deep" and "loud"** (as an example, in the parodos of the Clouds, both the sound of the *sea waves* and the rather shrill *aulos pipe* are described as barys).
- (All acutes that are not barys are called *oxys* (sharp), but it is mostly statistically insignificant and we focus on barys.)

*Allen 1973 with good summary p. 333f; for a modern optimality-theory (OT) derivation, see Blumenfeld 2004. First suggested in Hilberg 1879.

Metric 2: Phonological (barys) accent

Definition is the following ratio, where n = nr of strophes:

$$M_2 = \frac{n * (\text{Nr of sets of responding barys accents})}{\text{Total nr of barys accents in all strophes}}$$

LUNDS UNIVERSITET

Example revisited: Barys & oxys accent counting in the *parodos* of the Clouds

v.	**Strophe**	**Antistrophe**	**Metre**	**Name**
1	ἀέναοι Νεφέλαι,	παρθένοι ὀμβροφόροι,	– ◡(O)◡ – ◡◡(B) –	D (hemiepes)
2	ἀρθῶμεν φανεραὶ δροσερὰν φύσιν εὐάγητον	ἔλθωμεν λιπαρὰν χθόνα Παλλάδος, εὔανδρον γᾶν	– –(B) – ◡◡ – ◡◡ – ◡(O) ◡ – – – –	hexameter
3	πατρὸς ἀπ' Ὠκεανοῦ βαρυαχέος	Κέκροπος ὀψόμεναι πολυήρατον·	– ◡◡ – ◡◡ – ◡◡ – ◡◡	4 da
...				
9	μαρμαρέαισιν αὐγαῖς.	παντοδαπαῖσιν ὥραις,	– ◡◡ –(B) ◡ – –(B)	aristophanean
10	ἀλλ' ἀποσεισάμεναι νέφος ὄμβριον	ἦρί τ' ἐπερχομένῳ Βρομία χάρις	– ◡◡ – ◡◡ –◡◡ – ◡◡	4 da
11	ἀθανάτας ἰδέας ἐπιδώμεθα	εὐκελάδων τε χορῶν ἐρεθίσματα	– ◡◡ –(B) ◡◡ –(B) ◡◡ –(O) ◡◡	4 da
12	τηλεσκόπῳ ὄμματι γαῖαν.	καὶ μοῦσα βαρύβρομος αὐλῶν.	– – ◡◡ –(O) ◡◡ – –	paroemiac

Responding barys & oxys accents: 10 * 2 strophes = 20
Σ all barys & oxys accents: 20 + 21 = 41
Barys & oxys responsion metric (mean): 21/41 = **0.51**

Preparation for Metric 3:
A quantifiable theory of melody in lyric

LUNDS UNIVERSITET

Conser's definition of compatibility of melodic contour

- Since at least Crusius 1883, philologists have been using the extant Greek musical fragments to induce **rules by which the pitch accents of the lyrics restrict the melodic contour**.
  - NB: With *contour* I mean the **directions** (rising or falling or neither) of the intervals, with **their specific size unrestricted**.
- Four of the most important of these rules have been chosen by Conser as a basis for her operationalization of contour. (No time to go through them now!)
- By these rules, **each line is deterministically mapped to a series of contours.**

Metric 3: Melodic compatibility

- **Definition:** Two responding positions are **melodically incompatible** if one of them is rising while the other is falling. They are ***melodically compatible*** if they are not incompatible.
  - In a real composition melodically incompatible positions can be solved by setting all strophes to repeating notes.
- I extend Conser's definition to polystrophy in the following way: the **compatibility metric** $\mathbf{M}_3$ of two or more responding positions is calculated in the following way:
  - count the number of **rising** positions, then count the number of **falling** positions.
  - Add the number of repeating positions to the **larger** of the two counts, then divide that by the total number of responding positions. The resulting quotient will always be **between 0.5 and 1**. For 3-strophic songs it can take on 0.67 as well, and for 4-strophic plays 0.75.
- The compatibility metric of a line pair, a song or a play is simply the **mean** of the compatibility metrics of all constituent positions.
- **Giving credit**: I have rewritten and adapted snippets of code from Conser's open-source github project "Greek-Poetry" for my metric, and I am standing on her shoulder's here.

LUNDS UNIVERSITET

The corpus: How many strophic songs in the 11 extant plays by Aristophanes?

- *Ach.*: **9** songs (out of which 1 polystrophic with 4 strophes)
- *Eq.*: **8** = all songs in the play! (1 polystr. w. 4 strophes)
- *Nu.*: **6** s.
- *V.*: **8** s.
- *Pax*: **6** s. (1 polystr. w. 3 strophes)
- *Av.*: **10**
- *Lys.*: **8** (1 polystr. w. 4 strophes)
- *Th.*: **4**
- *Ra.*: **11** (2 polystrophic with 3 and 4 strophes respectively)
- *Ec.*: **6**
- *Pl.*: **2**

Total sum: **78**, out of which **2 three-strophic** and **4 four-strophic**

Results: Regressions and significance tests

For reasons of space we will focus on one result for each hypothesis:

- **Wahlström's general hypothesis:** Chi-square tests of metric 3 (melodic compatibility) on whole corpus against all baselines
- **Conser-style hypothesis:** Linear regression of *all three metrics* on Aristophanes' plays in chronological order
- **Wahlström's specific hypothesis:** Linear regression on metric 3 by position counted from end of line.

LUNDS UNIVERSITET

Result 1: Chi-square tests of melodic compatibility metric on whole corpus

LUNDS UNIVERSITET

Table of P-values from chi-square test

Type of null mean

Corpus groups by nr of refrains

	Antistrophic	3-strophic	4-strophic
Iambic trimeter (dialogue)	1e-20	0.6	0.003
Iambic tetrameter (lyric)	0.9 (!)	0.2	7e-13

- **Significance threshold α = 0.05; green** means **significant**, i.e. < α
- for values < 0.001 I use exp notation

LUNDS UNIVERSITET

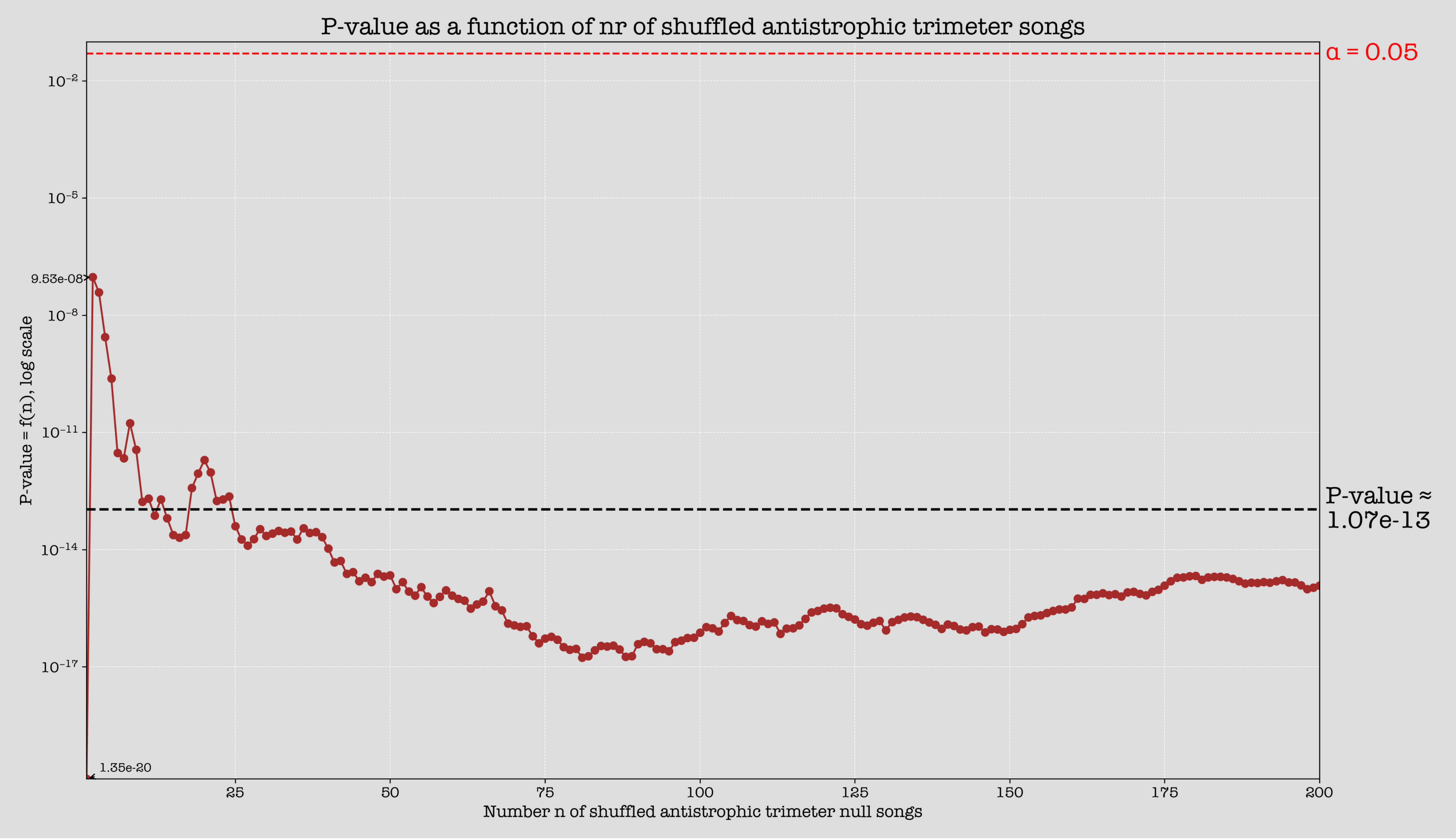
“Wait, is something wrong with the antistrophic tetrameter baseline?”

- The baseline seemed OK to me:
  - Made out of all tetrameters in my corpus
  - Two artificial “pseudo-strophes” of 23 lines each
  - Important: **No pair of responding lines even come from the same play**: strictly guaranteed statistical independence.
- But when I tried **shuffling** the lines randomly, the P-value first fell *down* to under the significance threshold, and when shuffled again jumped *up* again to the order of magnitude of the alpha threshold! Let’s plot this...


```xml
<canticum>
  <strophe type="strophe" responsion="lyricbaseline01">
    <l n="Acharnenses204" metre=""><syll weight="heavy">Τῇ</syll><syll weight="light">δε</syll> <syll weight="heavy">πᾶ
    <l n="Acharnenses205" metre=""><syll weight="heavy">τῶν</syll> <syll weight="light">ὁ</syll><syll weight="heavy">δο
    <l n="Acharnenses206" metre=""><syll weight="heavy">ξυλ</syll><syll weight="light">λα</syll><syll weight="heavy">βε
    <l n="Acharnenses207" metre=""><syll weight="heavy">εἴ</syll> <syll weight="light">τις</syll> <syll weight="heavy">
    <l n="Acharnenses219" metre=""><syll weight="heavy">Νῦν</syll> <syll weight="light">δ' ἐ</syll><syll weight="heavy">
    <l n="Acharnenses220" metre=""><syll weight="heavy">καὶ</syll> <syll weight="light">πα</syll><syll weight="heavy">λ
    <l n="Acharnenses221" metre=""><syll weight="heavy">οἴ</syll><syll weight="light">χε</syll><syll weight="heavy">ται
    <l n="Acharnenses222" metre=""><syll weight="heavy">μη</syll><syll weight="light">δέ</syll> <syll weight="heavy">πε
    <l n="Acharnenses284" metre=""><syll weight="heavy">Ἠ</syll><syll weight="light">ρά</syll><syll weight="heavy">κλει
    <l n="Acharnenses286-287" metre=""><syll weight="heavy">Ἂν</syll><syll weight="light">τὶ</syll> <syll weight="heavy"
```

P-value as a function of nr of shuffled tetrameter songs
P-value = f(n), log scale
Number n of shuffled tetrameter null songs
α = 0.05
P-value ≈ 9.63e-05
2.49e-02
1.08e-08
10^-1
10^-2
10^-3
10^-4
10^-5
10^-6
10^-7
20
40
60
80
100

Some are slower to “converge”... (even after 200)



LUNDS UNIVERSITET

Table of Asymptotic P-values from 100 chi-square tests with 1-100 shuffled null baselines

Type of null mean

Corpus groups by nr of refrains

	Antistrophic	3-strophic	4-strophic
Iambic trimeter (dialogue)	≈ e-13 to e-15 (on 200)	0.05 (barely sign.)	8e-7
Iambic tetrameter (lyric)	0.0001 *	0.6	0.4 *

- All tests done again on artificial null corpora of 100 randomly shuffled pseudo-songs instead of just one (200 for antistrophic trimeter)
- **P-values with an asterisk * changed from significant to insign. or vice verse**
- Looks convincing overall

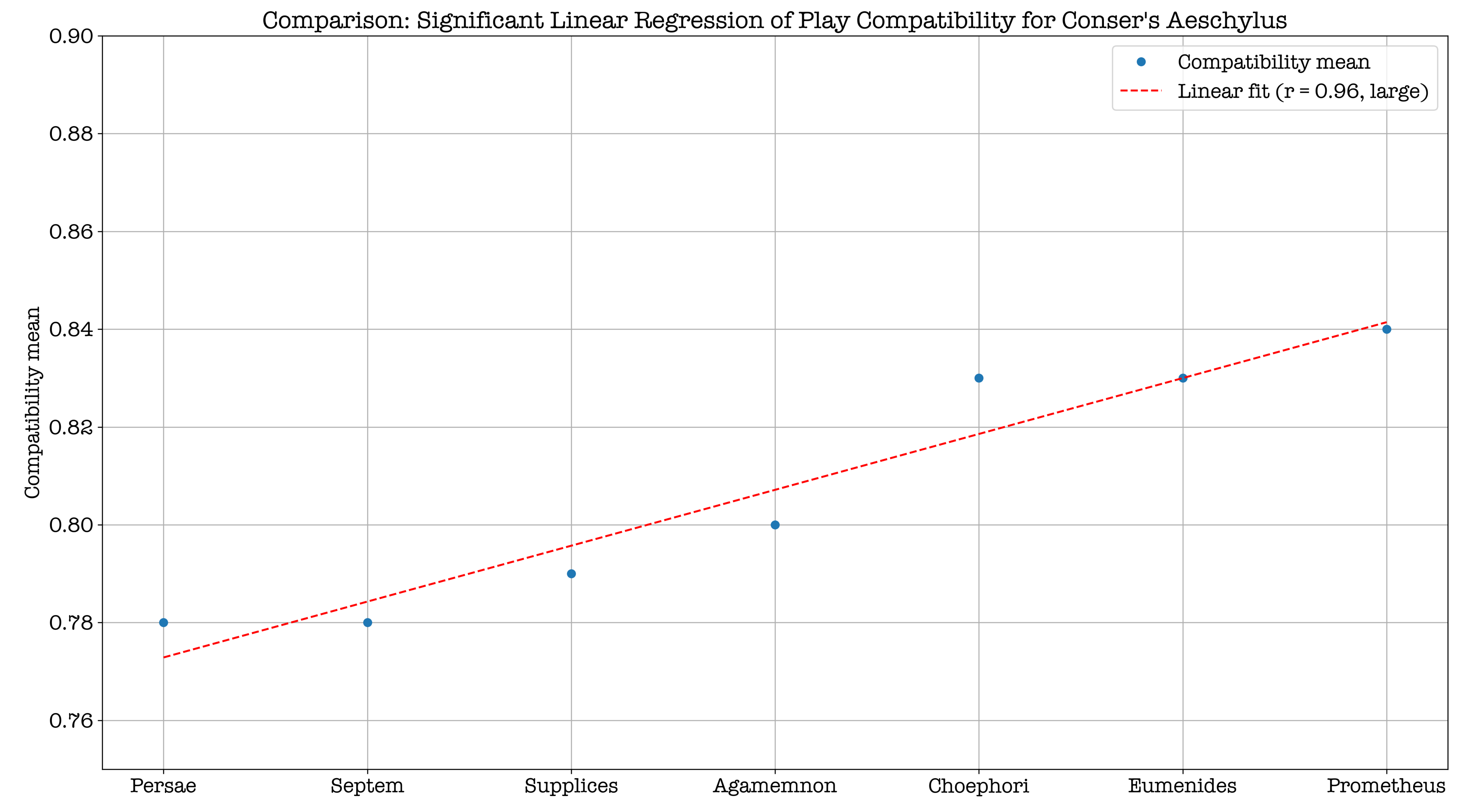
LUNDS UNIVERSITET

Lessons from result 1

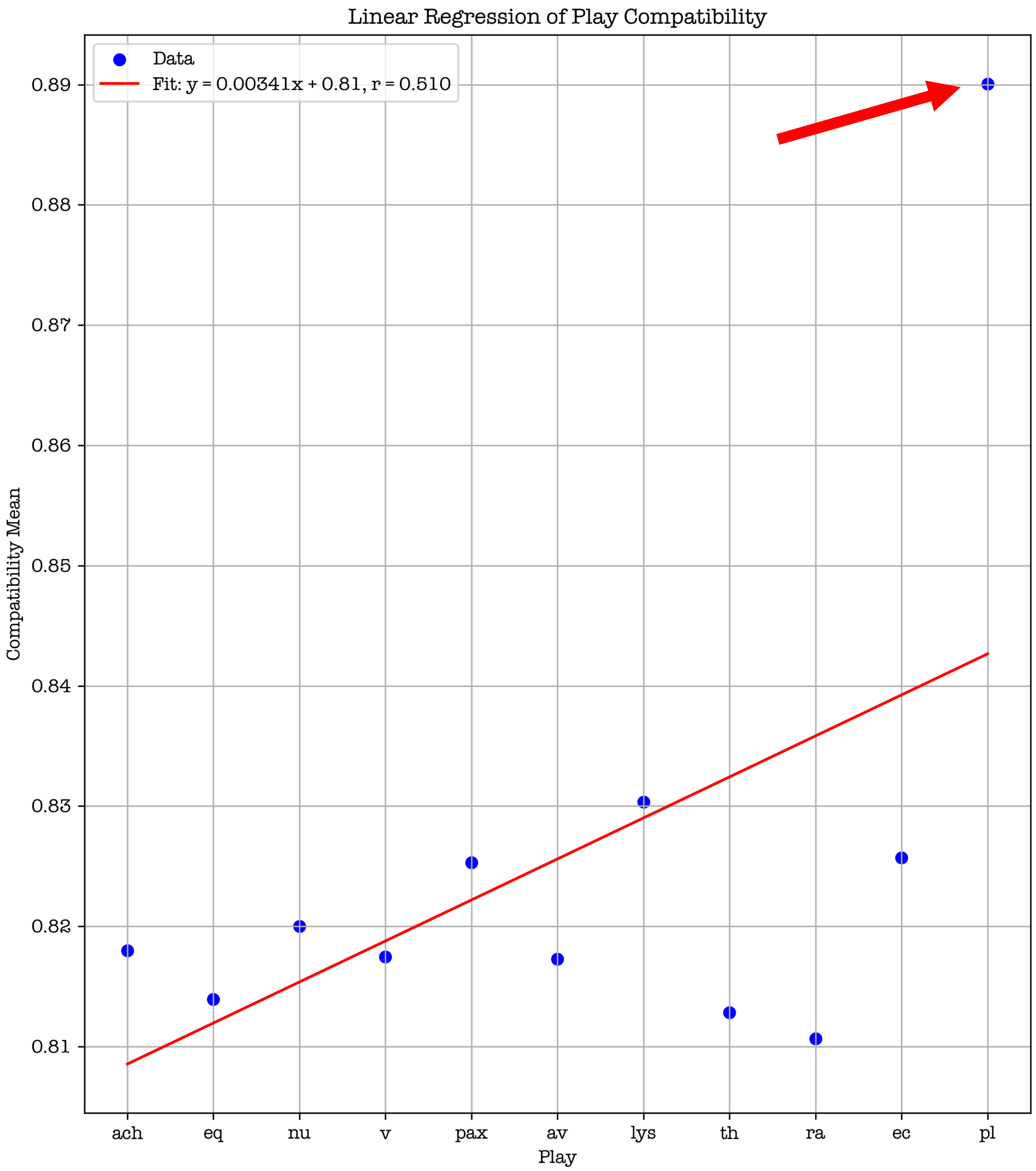
- When the null corpus is small it is unreliable, but **starts to converge already at around 10 times my initial null song**, i.e. **at around 200 responding pairs**
- The compatibility of Aristophanes **antistrophic** songs can be considered to be higher than what is to be expected in lyric put together randomly ✅
  - The polystrophic songs will have to be investigated more closely in the future!

Result 2: Linear regression of all three metrics on Aristophanes’ plays in chronological order

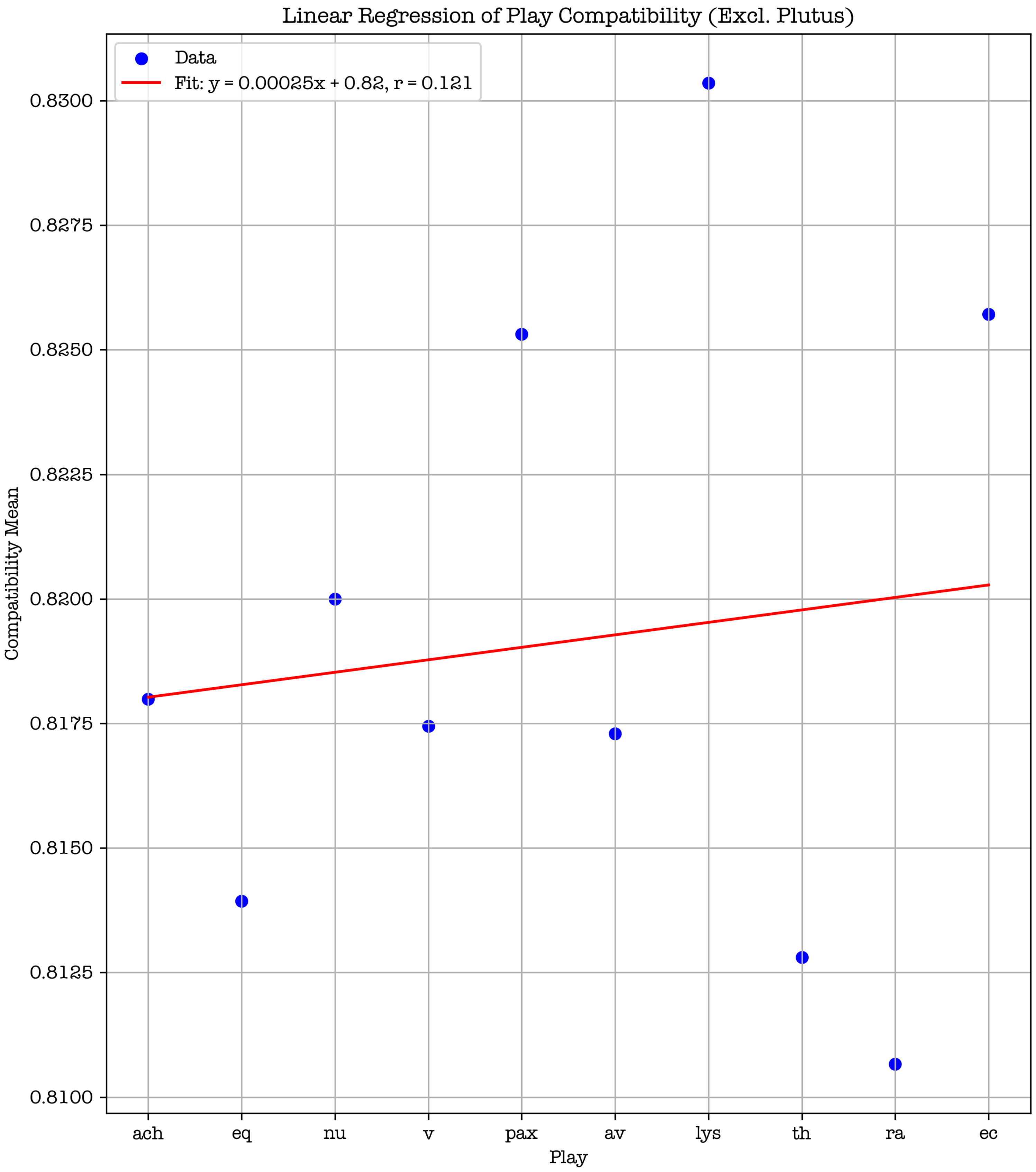
LUNDS UNIVERSITET



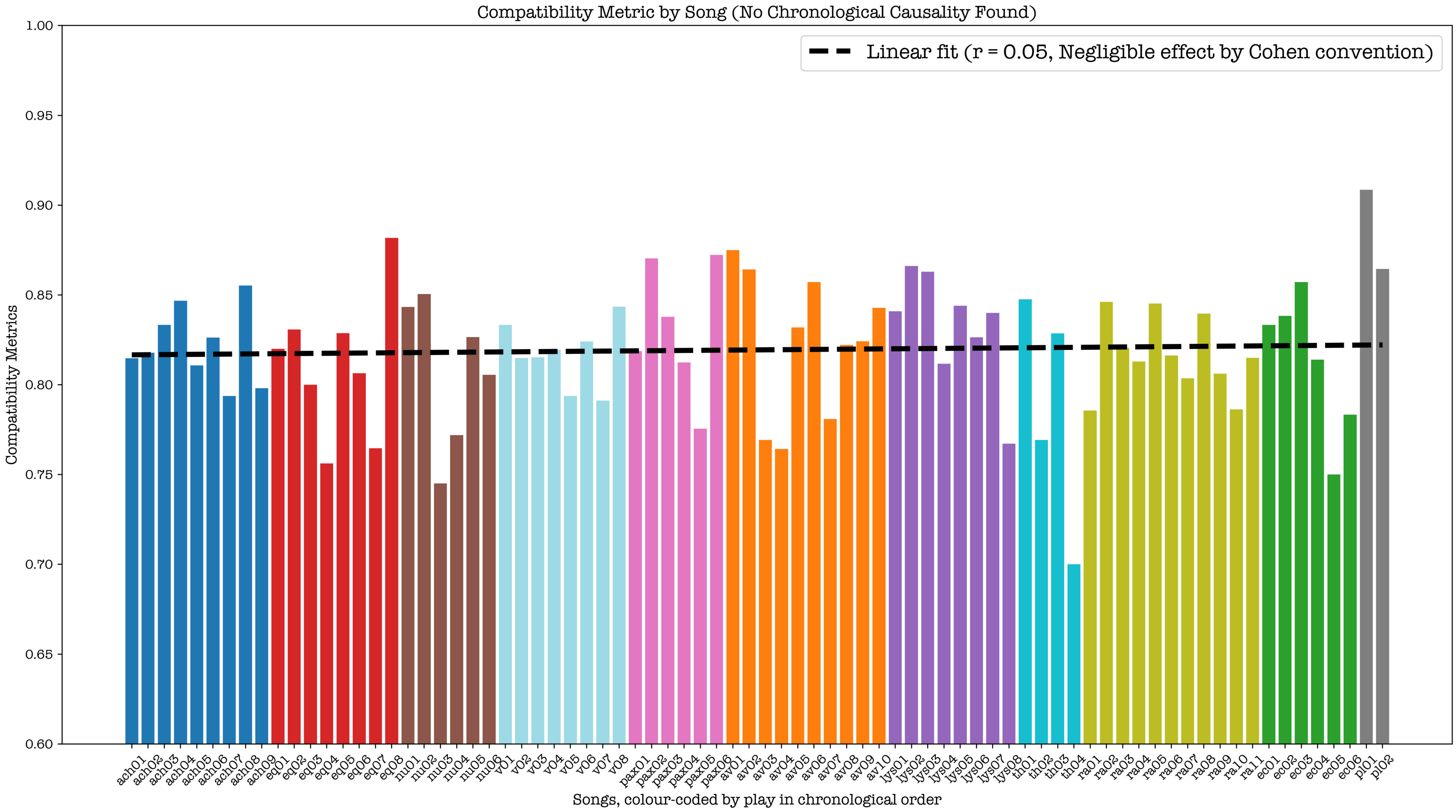
Comparison: Significant Linear Regression of Play Compatibility for Conser's Aeschylus
Compatibility mean
Linear fit (r = 0.96, large)
0.90
0.88
0.86
0.84
0.82
0.80
0.78
0.76
Persae
Septem
Supplices
Agamemnon
Choephori
Eumenides
Prometheus



Linear Regression of Play Compatibility
Data
Fit: y = 0.00341x + 0.81, r = 0.510
Compatibility Mean
Play
0.81
0.82
0.83
0.84
0.85
0.86
0.87
0.88
0.89
ach
eq
nu
v
pax
av
lys
th
ra
ec
pl

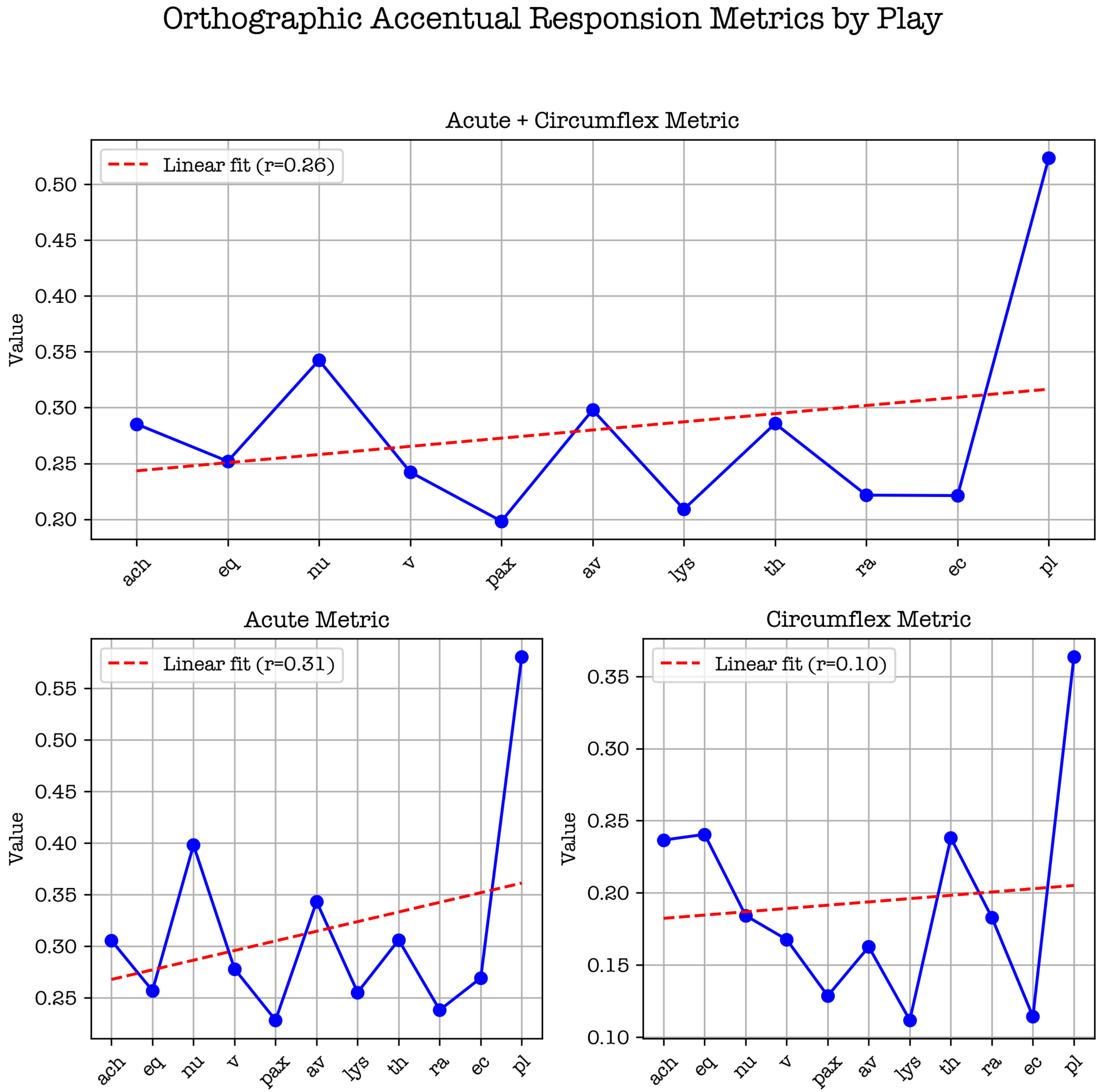


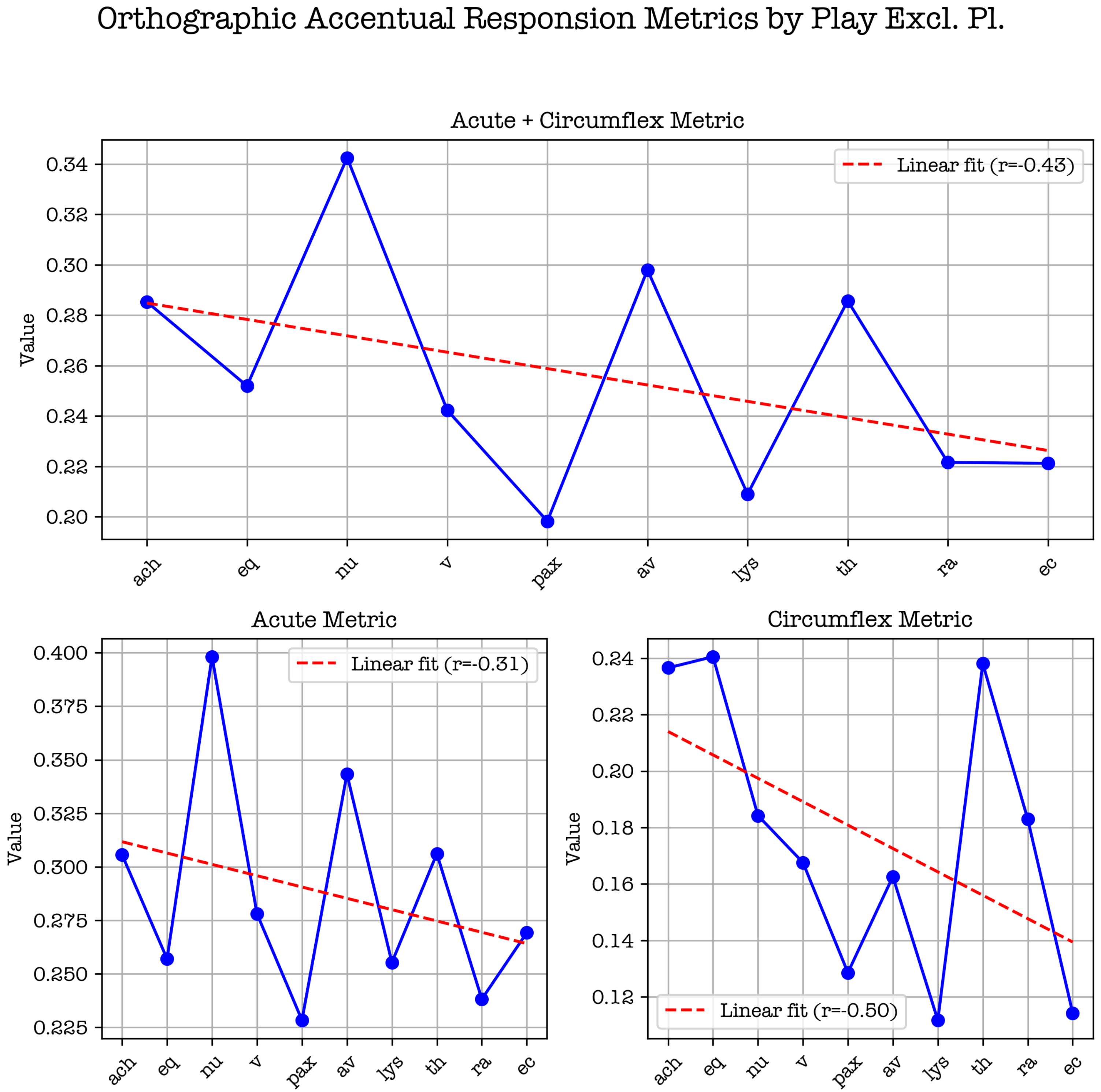
Linear Regression of Play Compatibility (Excl. Plutus)
Data
Fit: y = 0.00025x + 0.82, r = 0.121
Compatibility Mean
Play
0.8100
0.8125
0.8150
0.8175
0.8200
0.8225
0.8250
0.8275
0.8300
ach
eq
nu
v
pax
av
lys
th
ra
ec



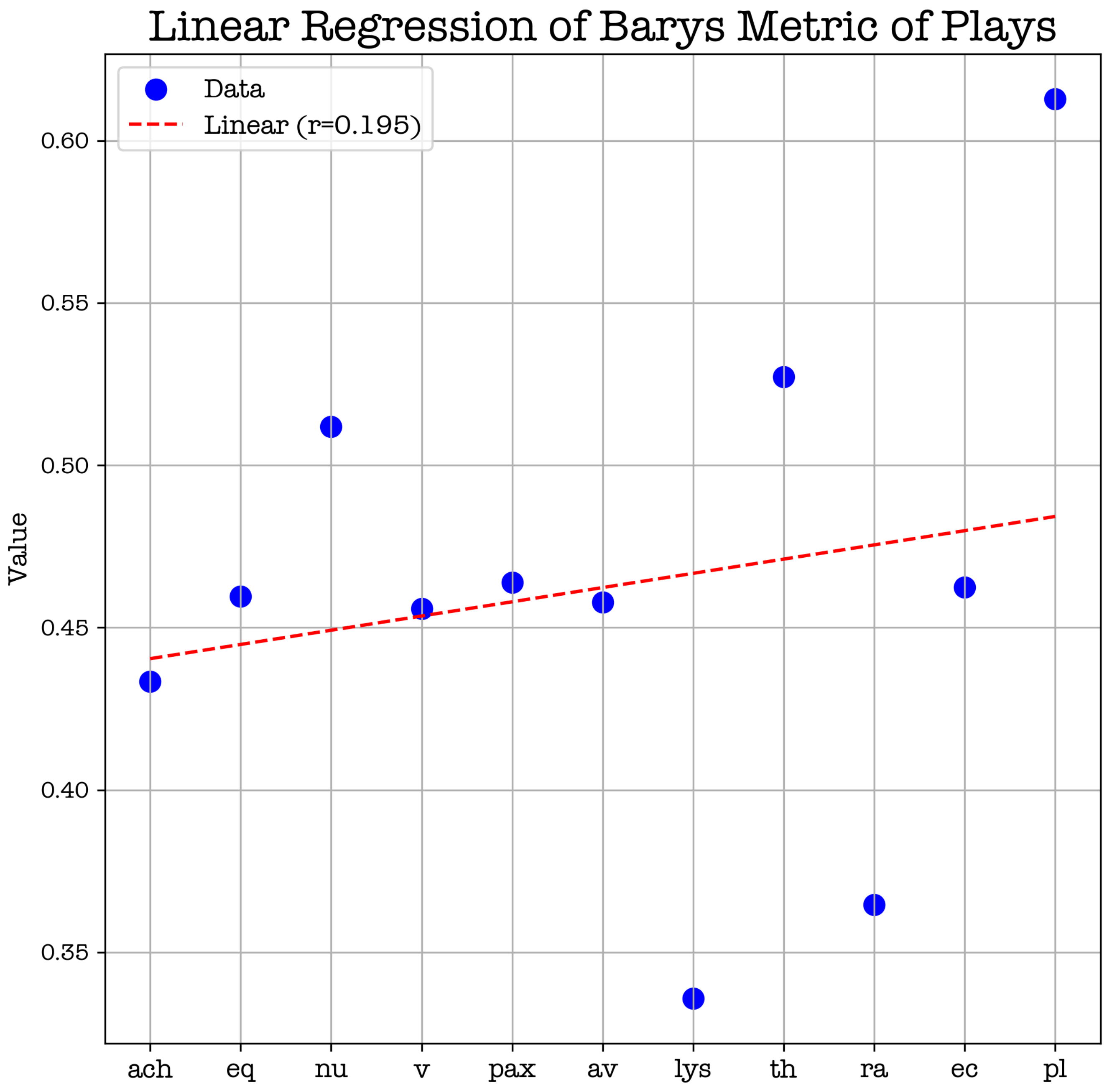
Compatibility Metric by Song (No Chronological Causality Found)
Linear fit (r = 0.05, Negligible effect by Cohen convention)
Compatibility Metrics
1.00
0.95
0.90
0.85
0.80
0.75
0.70
0.65
0.60
ach01 ach02 ach03 ach04 ach05 ach06 ach07 ach08 ach09 eq01 eq02 eq03 eq04 eq05 eq06 eq07 eq08 nu01 nu02 nu03 nu04 nu05 nu06 v01 v02 v03 v04 v05 v06 v07 v08 pax01 pax02 pax03 pax04 pax05 pax06 av01 av02 av03 av04 av05 av06 av07 av08 av09 av10 lys01 lys02 lys03 lys04 lys05 lys06 lys07 lys08 th01 th02 th03 th04 ra01 ra02 ra03 ra04 ra05 ra06 ra07 ra08 ra09 ra10 ra11 ec01 ec02 ec03 ec04 ec05 ec06 pl01 pl02
Songs, colour-coded by play in chronological order

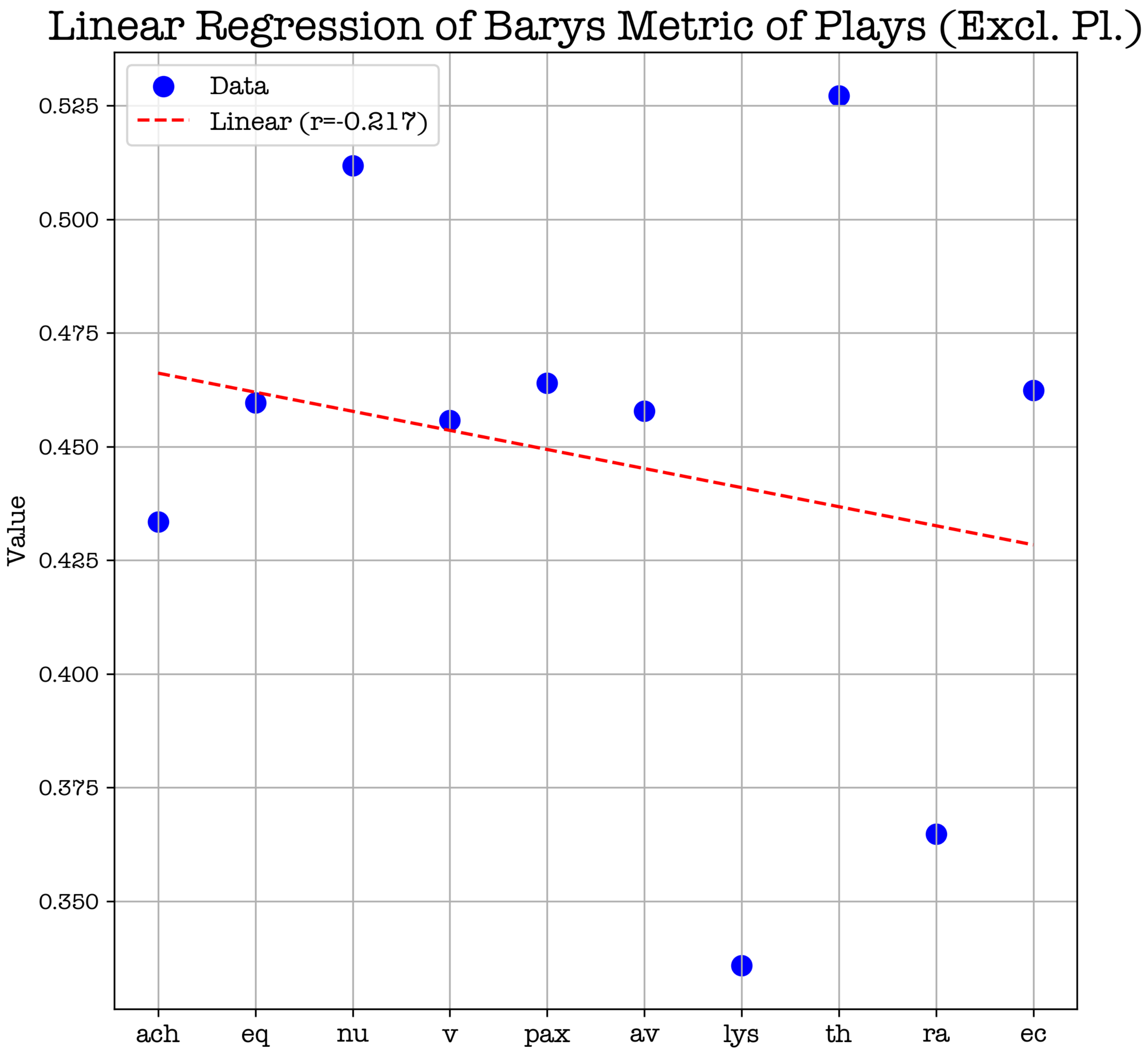
Linear regression of orthographic response (unstable)





Linear regression of barys responsion (unstable)





Aristophanes vs Aeschylus

- Not contemporary: Aeschylus died when Aristophanes was still a child
- Difference in results **tentatively** suggests that the change in **degree of submission of music to prosody was already cemented**.

Can we explain why *Plutus* ("Wealth") is such an outlier and defend removing it from the regression?

- Firstly, *Pl*. is **both** Aristophanes' **last play**, and has the **fewest refrains**, and hence gets unproportional "leverage" at **both** the end of the **x-axis** and **y-axis**, a classic text-book problem with linear regression**.
- Parker: "In *Wealth*, the use of lyric to provide a running commentary on the action has been altogether abandoned. [...] the lyric element has dwindled to a single, self-contained comic set-piece"*
- That "set-piece" has both of the responding songs.

*L. P. E. Parker, *The Songs of Aristophanes*, p. 555,
** Cf. e.g. the chapter on lin. regr. in Alm & Britton 2008, *Stokastik,* where the example has a data set with altitudes (y-axis) of Swedish villages ordered by latitude (x-axis); since Jokkmokk happens to simultaneously be both the northmost and the highest-situated of the set, it has an unproportional influence on the regression line in the same way *Pl*. has for us here.

Why do the 2 *Plutus* songs respond so tightly?

1) They are both antistrophic (as we've seen, polystrophy responds less in all ways)
2) They constitute the four verses of a "diegetic" (story-world) song: the characters explicitly say that they are lampooning a known song (identified by scholiasts as Philoxenus' "Cyclops and Galatea").
3) The protagonist (Karion) singing the strophe **explicitly urges the chorus to "follow" him** in the antistrophe, and **both strophes strongly affirm that they sing to the melody of the "Cyclops"**. Hence this is an extremely rare case where we can **very confidently assert that the strophes were sung to the same melody**.
4) In each of the songs, the last half of the first line of both refrains is the same, surely a quotation of the original song. Exact repetition warps the statistics.

ΚΑΡΙΩΝ

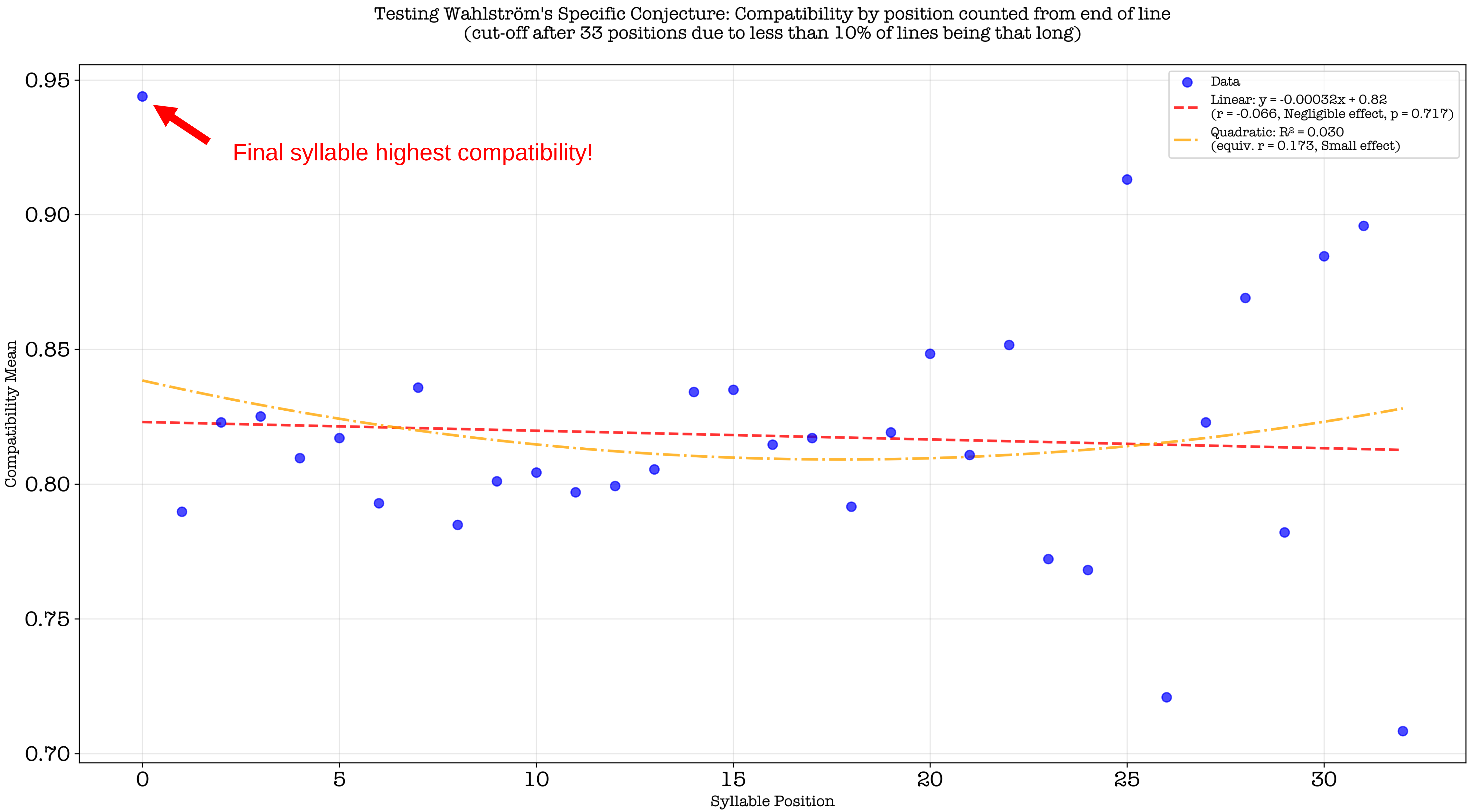
(στρ.) *καὶ μὴν ἐγὼ βουλήσομαι—θρετταν̣ελο—τὸν*
Κύκλωπα
μιμούμενος καὶ τοῖν ποδοῖν ὡδὶ παρενσαλεύων
ὑμᾶς ἄγειν. ἀλλ' εἶα, τέκεα, θαμίν' ἐπαναβοῶντες
βληχώμενοί τε προβατίων
αἰγῶν τε κιναβρώντων μέλη
ἕπεσθ' ἀπεψωλημένοι·
τράγοι δ' ἀκρατιεῖσθε.

ΧΟΡΟΣ

(ἀντ) *ἡμεῖς δέ γ' αὖ ζητήσομεν—θρετταν̣ελο—τὸν*
Κύκλωπα
βληχώμενοι σὲ τουτονὶ πεινῶντα καταλαβόντες,
πήραν ἔχοντα λάχανά τ' ἄγρια δροσερά,
κραιπαλῶντα
ἡγούμενον τοῖς προβατίοις,
εἰκῇ δὲ καταδαρθόντα που
μέγαν λαβόντες ἡμμένον
σφηκίσκον ἐκτυφλῶσαι.

Result 3: Wahlström’s specific conjecture on line ends

LUNDS UNIVERSITET


Testing Wahlström's Specific Conjecture: Compatibility by position counted from end of line
(cut-off after 33 positions due to less than 10% of lines being that long)
Final syllable highest compatibility!
Data
Linear: y = -0.00032x + 0.82
(r = -0.066, Negligible effect, p = 0.717)
Quadratic: R² = 0.030
(equiv. r = 0.173, Small effect)
Compatibility Mean
Syllable Position
0.95
0.90
0.85
0.80
0.75
0.70
0
5
10
15
20
25
30

Summary

- Compatibility of melodic contour between Aristophanes' responding refrains is on the whole more significant than the noise floor of the null baseline, which tentatively **corroborates Wahlström's hunch regarding Greek lyric** in general
- **No evidence for change in melodic writing over Aristophanes' career**, which distinguishes him from Conser's Aeschylus
- With Wahlström we can see **tighter responsion at the very final position**, but no linear (or quadratic) general tendency

LUNDS UNIVERSITET

Postlude: So, which of the graces of ancient lyric verse have "fallen" into the closet?

αἱ Χάρῐτες, τέμενός τῐ λᾰβεῖν ὅπερ οὐχῐ̀ πεσεῖται (*ia. hexameter*)

ζητοῦσαι, ψῡχὴν εὗρον Ἀρῐστοφᾰ́νους (– ⏖ – ⏖ – | – ◡◡ – ◡◡ –)

The Graces, looking to lay their hands on a sacred precinct (τέμενος) that will never fall, found the soul of Aristophanes.

(Elegiac distich, Plato (?), epigram 14, **130** in Henderson's Aristophanes, *Fragments*, Loeb, 2008)

If you research a language with pitch/tone, reach out and we can compare notes!

albin.thorn_cleland@klass.lu.se

All data, source code and notebooks with tons of more plots are available at:

github.com/Urdatorn/aristophanis-cantica

LUNDS UNIVERSITET

LUNDS
UNIVERSITET

Plan

- Previous research
- Hypotheses
- Comparative evidence from other languages
- The three metrics of accentual responsion
  - Orthographical
  - Phonological
  - Musical
- Preparing the corpus
- Results: Regressions and statistical hypothesis tests
- Summary

LUNDS UNIVERSITET

Notes on my terminology

- With 'Greek' I always mean *Ancient* Greek and specifically the language before the disappearance of phonemic pitch (strictly we're only concerned with the late 6th to early 4th centuries B.C. here)
- Two strophes (i.e. refrains) are said to ***respond*** if they have the same metre (sequence of light and heavy sylls)
  - Two *lines* respond if they belong to responding strophes and they are both the *n*:th line
  - On the smallest level, what correponds is not syllables in the linguistic sense, but metrical *positions*
  - Responsion creates an unequivocal way to refer to the same position within several strophes
  - Responsion can be extended to other phenomena, such as word breaks, words or accents, which then rest on the scaffolding of metrical responsion
- I use 'pitch' and 'tone' interchangeably for easier comparison between s.c. "pitch-accent" and "tonal" language
- 'Accent' will be used in two main senses, depending on the context:
  - orthographical (w.r.t. the 3 diacritics *acute* (´), *circumflex* (˜) and *grave* (`))
  - relating to the phonemic pitch contours, which in Greek come with stress (explained more later!)

Quick note on the pitched accents

The Greek accents are “phonemic tones”. It is helpful to compare with other languages:

- Swedish:
  - from *tomt* (land lot): ***tomten*** (acute)
  - from *tomte* (Santa Claus): ***tomten*** (grave)
- Thai:
  - ไกล (/**kaj**/, "far", middle tone) vs ใกล้ (/**kâj**/, "close", falling tone)
- Greek:
  - **ὦ** (vocative marker) vs **ὤ** (interjection of surprise etc)
  - **οἶκοι** (nom. pl. of οἶκος, house), **οἴκοι** (locative, “at home”)

Some very quick comparative evidence for accentual responsion!

Example of melodies taking tone into consideration:
Cantonese opera

Figure 3 One line sung to the tune Chatjiching in Cantonese opera

From Young 1991, “The relationship of text and tune in Chinese opera”,
Music, Language, Speech and the Brain,
Wenner-Gren Center International Symposium Series, Stockholm

LUNDS UNIVERSITET

Example of verse forms regulating phonemic tone:

Example: Tonal patterning in Middle Chinese lǜshi *verse from the Tang dynasty.*
Spring scene by Dù Fǔ (712–770)

Pentameter 2+2+1 with set tone patterns:

Tone class “l” (level and rising)

Tone class “–” (falling)

国破山河在，

kuɣ˥ pʰɒ˧˥ ɕʁan˥˧ ɣɑ˨˩ dzɑj˧˥

| | – – |

城春草木深。

dʑjəjŋ˨˩ tɕʰʉn˥˧ tsʰʌw˥ məwɣ˧ ɕɨm˥˧

– – | | – Δ

Tonal patterning scheme adapted from Cai 2008,
How to read Chinese poetry : a guided anthology

The 4 rules of tone contours

- **Pitch-Height Rule**: Within one and the same word, the melody never reaches a *higher* point than on the syllable bearing the primary accent
  - NB: the melody is allowed to reach the *same* point more than once!
- **Pre-accentual rise**: the melody tends to rise before any of the three accent signs
- **Post-accentual fall**: the melody tends to fall after acute and circumflex, but not after grave.
- **Melismatic circumflex**: the melody may sink within a circumflex that is set to more than one note.
- Each line of verse is thus mapped to a series of **contours**, jointly implied by the accents and the rules.

Exempel på inkompatibilitet

Exempel från *Nubes*, 279~302, rytm – ⏕ – … (början på dakt. kolon):

Strof: **ὑψ-****η****-λῶν**

- Reglerna => stigande efter andra positionen (η), fallande efter tredje (λῶν), som också har högsta tonen; ex. *e, f, g, f*

Antistrof: **οὗ σέ-βας ἀρ-**

- Reglerna => stigande efter första positionen (oproblematiskt), fallande efter andra positionen (σέ); ex. *e, f, e,* …