

# “TELLING A STORY.” ON THE DRAMATURGY OF MONOPHONIC JAZZ SOLOS

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## Introduction

- The **storytelling metaphor** is ubiquitous in jazz parlance [2, 3, 5].
- However, storytelling in a **non-denotative language** such as music is hardly possible in a literal sense.
- **Hypothesis:** One part of the story telling metaphor might refer to **modal analogies**, i.e., intensity and tension changing in time.
- **Aims:** Exploring the time courses of selected features (“**dramaturgy**”) of monophonic jazz solos to unveil possible foundations for the story telling metaphor.
- We conducted three studies:
  1. Investigation of **global trends of pitch and intensity**, note-based.
  2. Investigation of **global trends of selected features** related to tension, variability and intensity based on phrases.
  3. Investigation of **distribution of ideas** with respect to position in a solo.
- Out of scope: **Player interaction, overall dramaturgy.**

## Data

- Study 1&2: **299 monophonic solos** by 70 soloist taken from the Weimar Jazz Database, covering a wide range of styles and performers.
- Study 3: A subset of **116 solos** of the Weimar Jazz Database equipped with midlevel annotations.

## Intensity and pitch

### Method

- For each solo, pitch and intensity values [1] were extracted.
- **Onsets** were **normalized** to the interval 0–1.
- Overall trends were extracted by **fitting quadratic polynomials**.
- Quadratic trends classified in five categories: **non-significant, horizontal, ascending, descending, convex, concave**.
- **non-significant** assigned to solos with non-significant fits ( $p > .01$ ).
- **horizontal** assigned to solos with significant fits, but  $\bar{R}^2 < .1$ .

### Results

- Most solos are **flat (non-significant or horizontal)**.
- **57.9%** of pitch curves and **47.0%** of intensity curves showed sig. quadratic fit.
- **18.8%** of pitch curves and **10.1%** of intensity curves showed non-flat trend.
- Intensity and pitch are correlated ( $r = .2, p < 0.001$ ), particularly for brass instruments (cf. [1]).
- **Convex** shapes are the **most common sig.** trends in both domains.
- Significant differences between performers (Kruskal-Wallis,  $p = .012$ ), instrument ( $p = .014$ ), rhythmic feel ( $p = .002$ ), and tempo class ( $p = .02$ ) for  $\bar{R}^2$  could be found in the class of significant pitch fits, but not for significant intensity fits.

Trend	Intensity		Pitch	
	#	%	#	%
non-significant	158	53.0	126	42.1
horizontal	110	36.9	117	39.1
ascending	8	2.7	6	2.0
descending	2	0.7	8	1.0
convex	15	5.0	38	12.7
concave	5	1.7	9	3.0

TABLE 1: Distribution of quadratic trends for intensity and pitch curves.

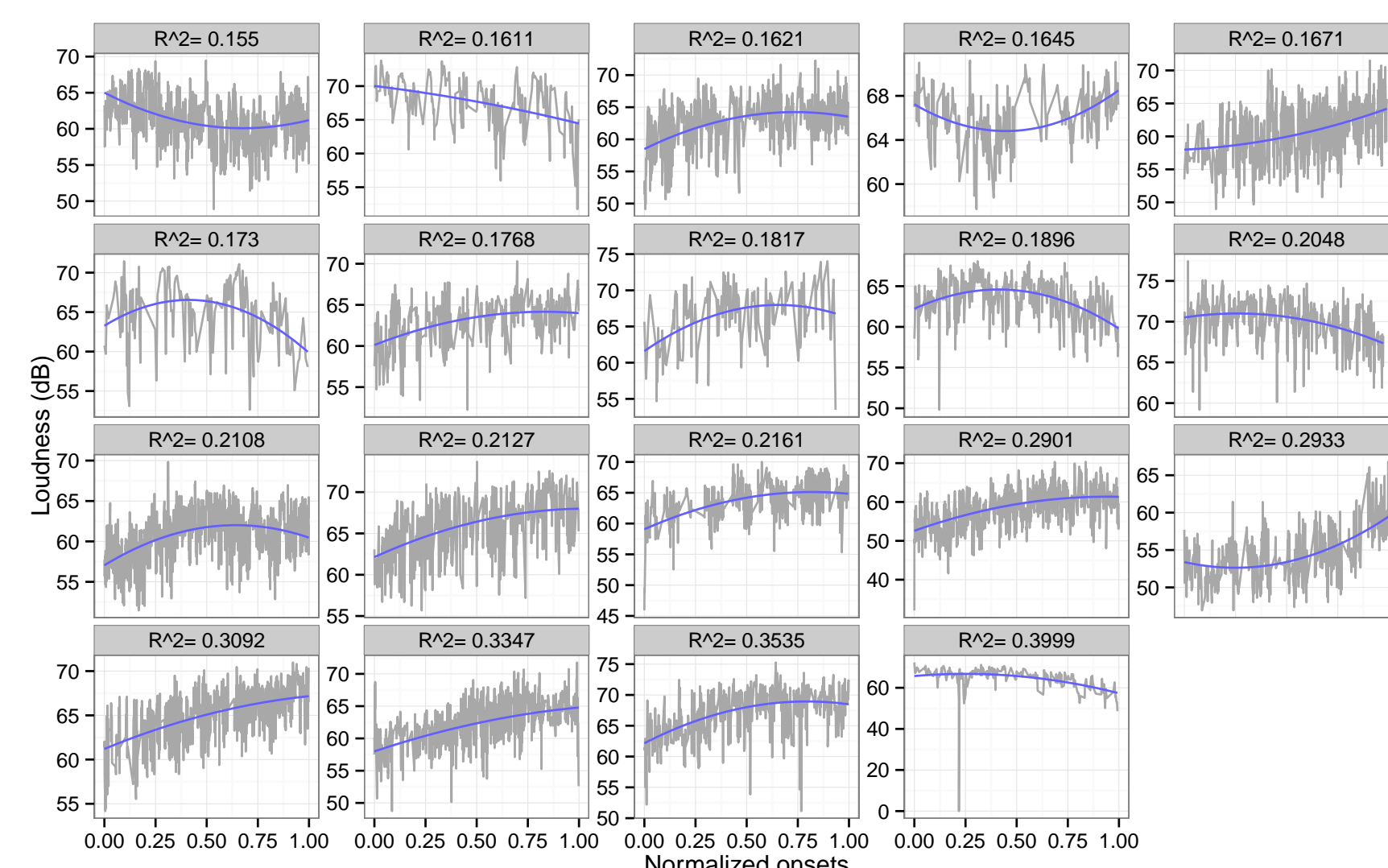


FIGURE 1: Polynomial fits (2th order) to intensity curves for 19 solos. Only curves with  $\bar{R}^2 > .15$  are shown.

## Selected features

### Method

- 12 scalar features were extracted for each phrase of each solo using the **MeloSpyGUI**[4] (cf. Tab. 2).
- Phrase positions were **normalized** and quadratic polynomials were fitted with  $\alpha = .01$ .
- Shapes were classified as in Study 1.

Feature	Type	Description
number notes	Intensity	Number of notes in a phrase.
pitch mean	Intensity	Mean value of pitches.
event density	Intensity	Events per second.
abs_int_range	Intensity	Range of absolute interval sizes.
outside	Tension	Proportion of dissonant tone.
durclass_abs_entropy	Variability	Entropy of duration classes.
cpc_zipf	Variability	Zipf coefficient of chordal pitch classes.
fuzzy_int_entropy	Variability	Entropy of refined contour classes.
pitch_entropy	Variability	Entropy of pitches.
pitch_range	Variability	Pitch range (ambitus).
mcm_entropy	Variability	Entropy of metrical positions.
CV_dur	Variability	Coefficient of duration variation.

TABLE 2: List of selected features.

### Results

Feature	# sig.	BF asc	desc	concave	convex
pitch mean	28	9.4	3	0	4
event density	21	7.0	3	0	1
fuzzyint_entropy	18	6.0	2	1	2
CV_dur	17	5.7	2	1	12
mcm_entropy	14	4.7	1	0	0
pitch_entropy	13	4.3	1	0	0
durclass_abs_entropy	12	4.0	1	1	6
number notes	10	3.3	3	0	1
pitch_range	10	3.3	2	0	2
abs_int_range	9	3.0	3	0	3

TABLE 3: Number and shapes of sig. quadratic fits  $\alpha = .01$  for features with more than three times the number of expected significant tests (Bayes Factor ( $BF$ )  $> 3$ ).

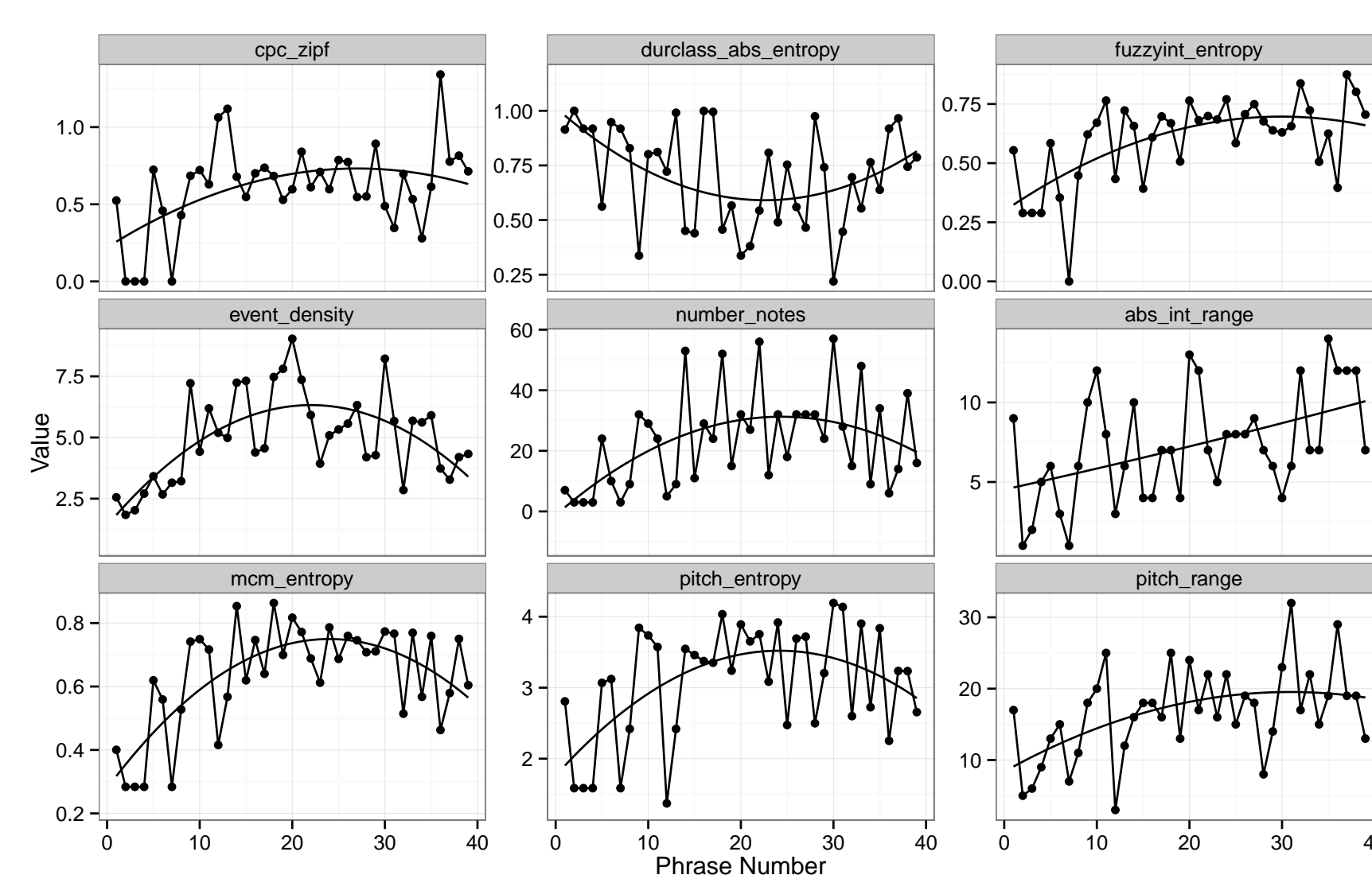


FIGURE 2: Significant polynomial fits (2th order) for Bob Berg's solo on “I Didn't Know What Time It Was” (1979).

## Midlevel analysis

### Method

- Midlevel analysis is a **qualitative method** for categorizing ideas in jazz improvisations.
- Solos are annotated manually with non-overlapping, exhaustive sequences of midlevel units coming from 9 main types with 18 subtypes.
- Relative starting position in a solo is measured with **normalized note numbers**.

### Results

- Relative positions of main types are significantly different ( $F(8, 4403) = 8.618, p = 0.000^{***}$ ).
- **theme** (median rel. pos = .22), **quote** (.33) and **void** (.38) occur earlier (relaxed begin.).
- The most expressive types **expressive** (.63) and **rhythm** (.62) occur later (late climax).
- **licks** and **melody** show a tendency to bi- or multi-modality

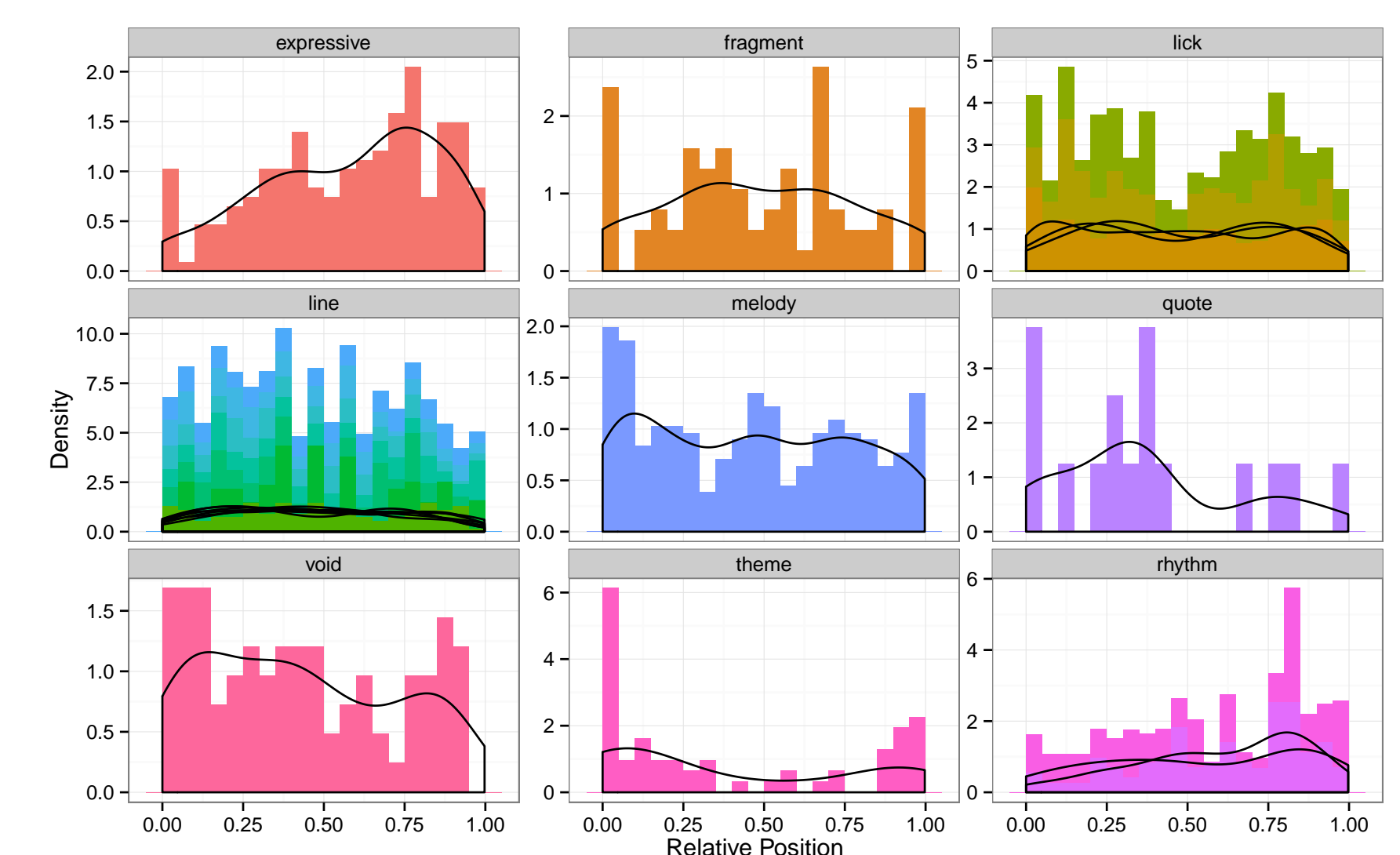


FIGURE 3: Distribution of main and subtypes of ideas with respect to relative position (normalized note number).

## Discussion

- First explorative statistical analysis of macro-level structures of jazz solos.
- Global (quadratic) trends for some solos on some variables could be observed.
- Intensity related measures tend to convex shapes with peaks in the second half of the solo.
- Most solos do **not** show significant linear or quadratic trends with respect to our measures.
- Trends of higher order are worth further examination in the future.

### Acknowledgments

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### References

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