Musical Micro-Timing for Live Coding

Introducing metre and style-specific probabilistic micro-timing to Sonic Pi

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Introduction

Consider metre as a mental "grid" for events

Expressive micro-timing

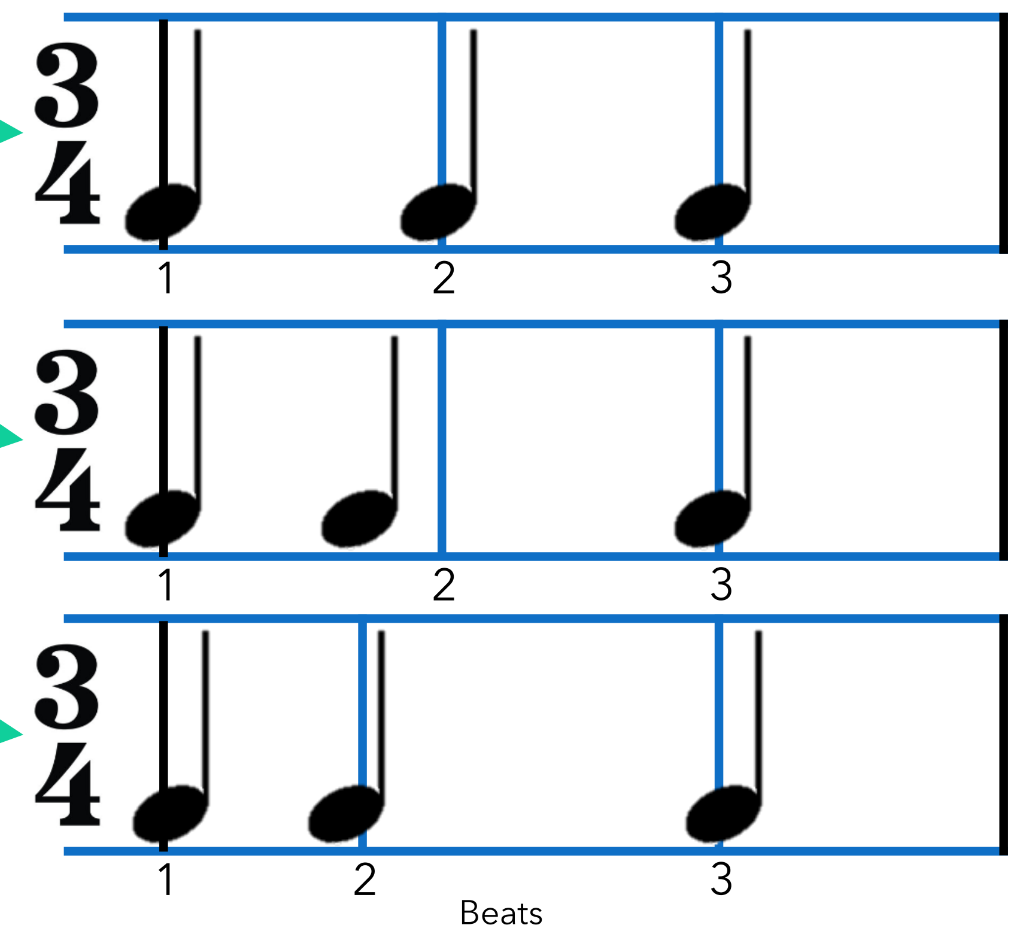
- Events expressively altered from categorical positions

Categorical micro-timing

- Uneven spaces between grid lines (the metre itself is uneven)

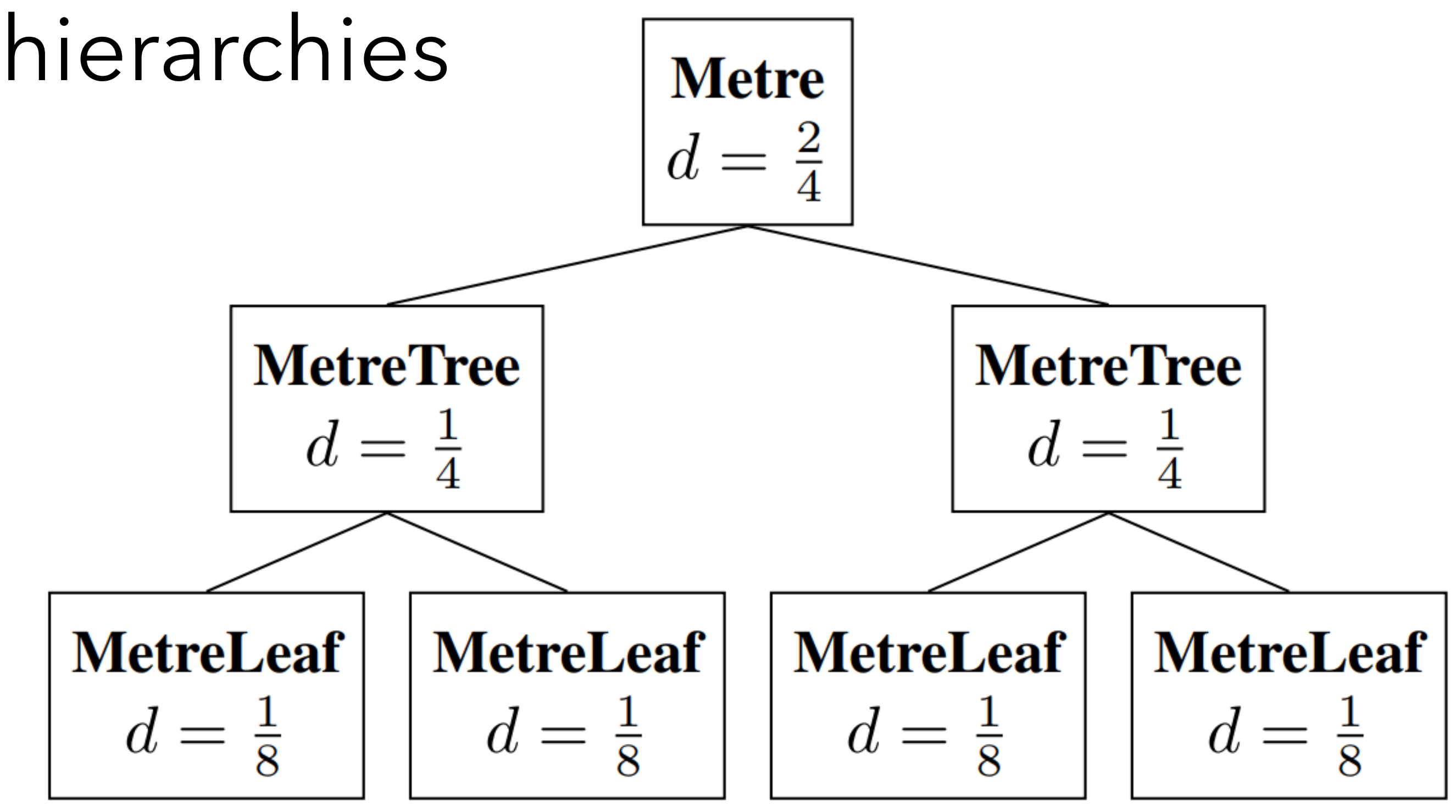
Sonic Pi live coding language

- How can we improve the "life-likeness" for specific styles? π)))

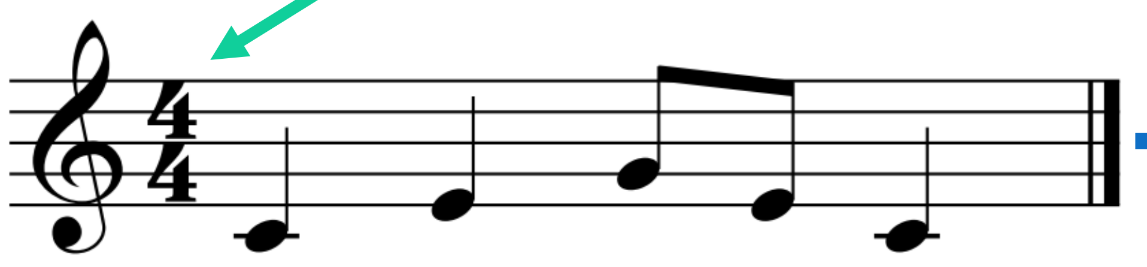


Metre

Nested objects allow for arbitrary metrical hierarchies



Retains information about the metre!



equivalent to

Western music notation

```
use_metre '4/4'
bar do
     add_note :C4, 0, 1
     add_note :E4, 0, 1
     add_note :G4, 1, 1
     add_note :E4, 1, 1
     add_note :C4, 0, 1
end
```

New Sonic Pi commands

(Specify note durations in terms of position in metrical hierarchy)

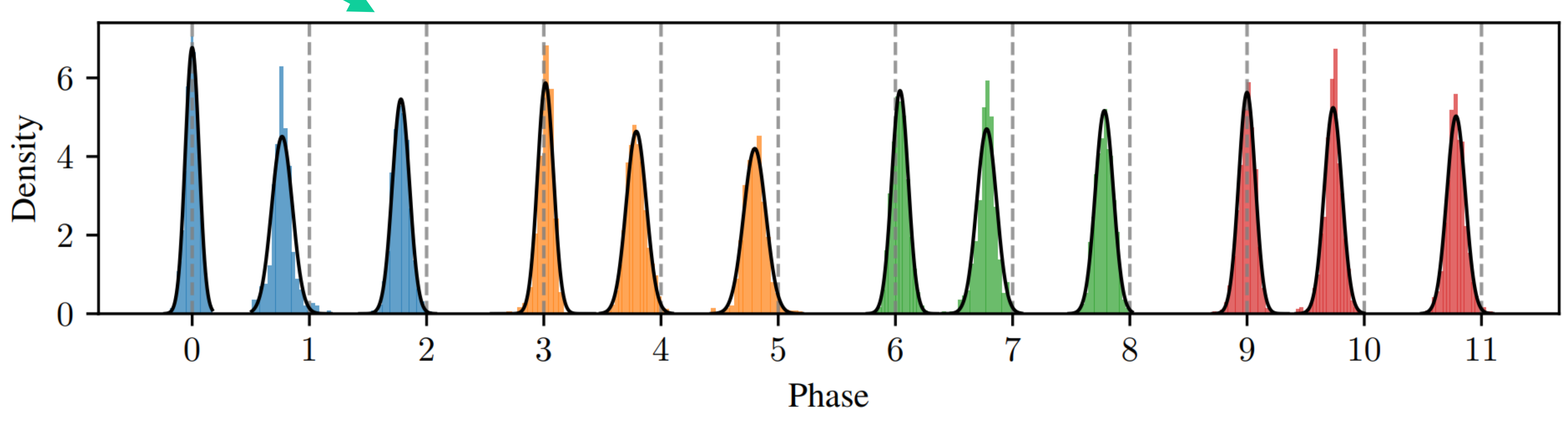
Micro-timing

Probabilistically alter the timing of each note according to its metrical location

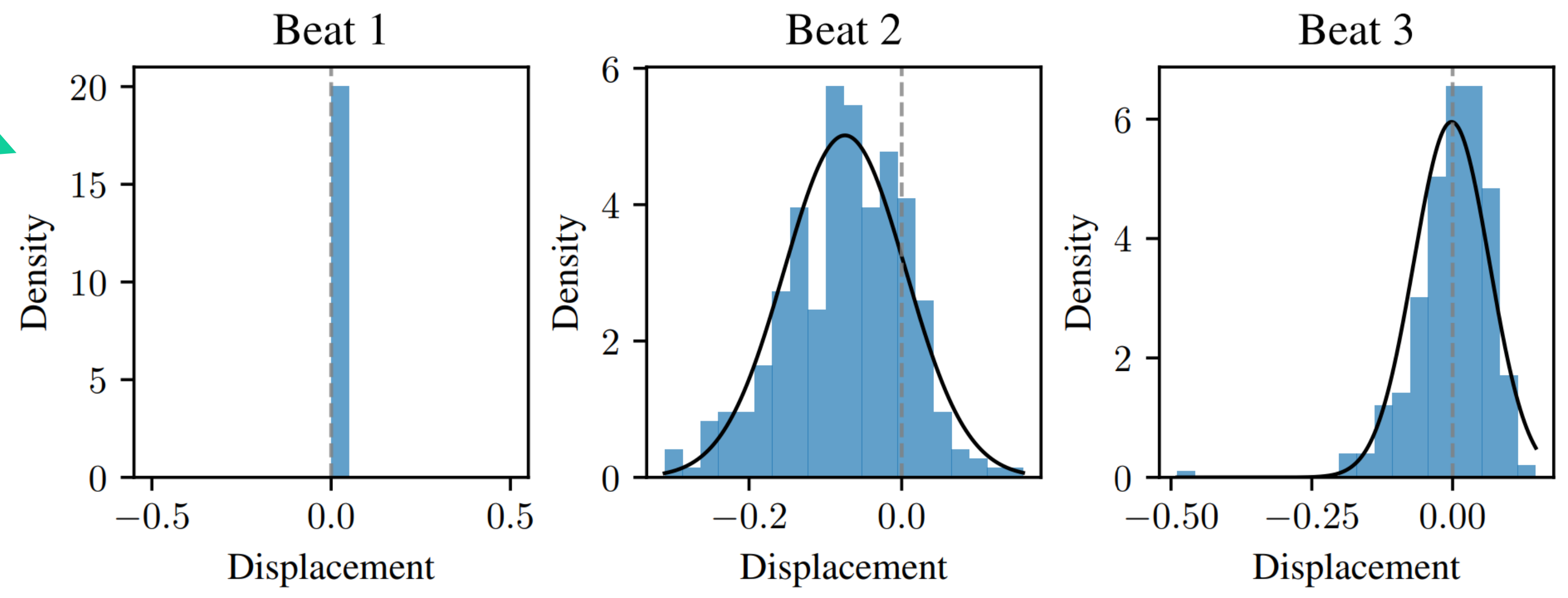
Analyse timings from performances relative to isochronous grid → Fit probability distribution with MLE (these encode the *actual*, non-isochronous metre) → Store a distribution for each event at each level → When playing a note, draw random samples and adjust timing accordingly

Results

Micro-timing data analysis results for two case study styles: Viennese waltz and Malian jembe



Shows a short-medium-long pattern. Black curves show the PDF of the probability distributions.



The second beat in each bar is slightly "early" (short-long-medium pattern).

Acknowledgements

- References and full details can be found in the paper.
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Source code