Comparing Three Designs of Macro-Glyphs for Poetry Visualization

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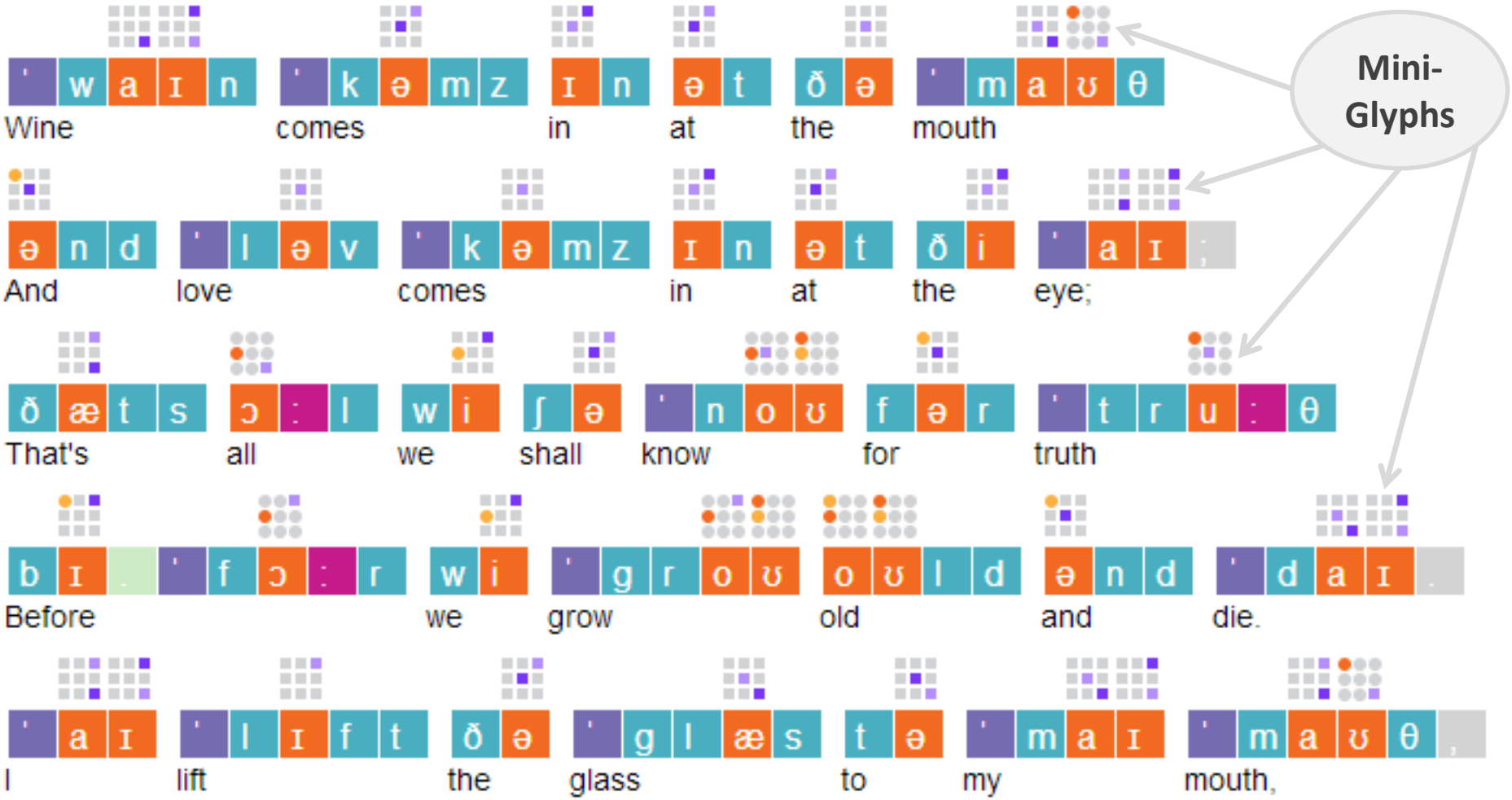
A Drinking Song by *William Butler Yeats*

Wine comes in at the mouth
And love comes in at the eye;
That's all we shall know for truth
Before we grow old and die.
I lift the glass to my mouth,
I look at you, and I sigh.

Poetry Visualization – Close Reading



Abdul-Rahman *et al.*, Rule-based visual mappings – with a case study on poetry visualization, CGF, 2013.

Visualization of Phonemic Features

Wine comes in at the mouth
And love comes in at the eye;
That’s all we shall know for truth
Before we grow old and die.
I lift the glass to my mouth,
I look at you, and I sigh.

ˈwaɪn ˈkəmz ɪn ət ðə ˈmaʊθ
ənd ˈləv ˈkəmz ɪn ət ðɪ ˈaɪ;
ðæts ˈɒl wi ʃə ˈnoʊ fər ˈtruːθ
bɪ.ˈfɔːr wi ˈgroʊ oʊld ənd ˈdaɪ.
ˈaɪ ˈlɪft ðə ˈglæs tə ˈmaɪ ˈmaʊθ,
ˈaɪ ˈlʊk ət ju, ənd ˈaɪ ˈsaɪ.

*

* Ladefoged and Disner, Vowels and Consonants, 3rd Edition, Wiley-Blackwell, 2012.

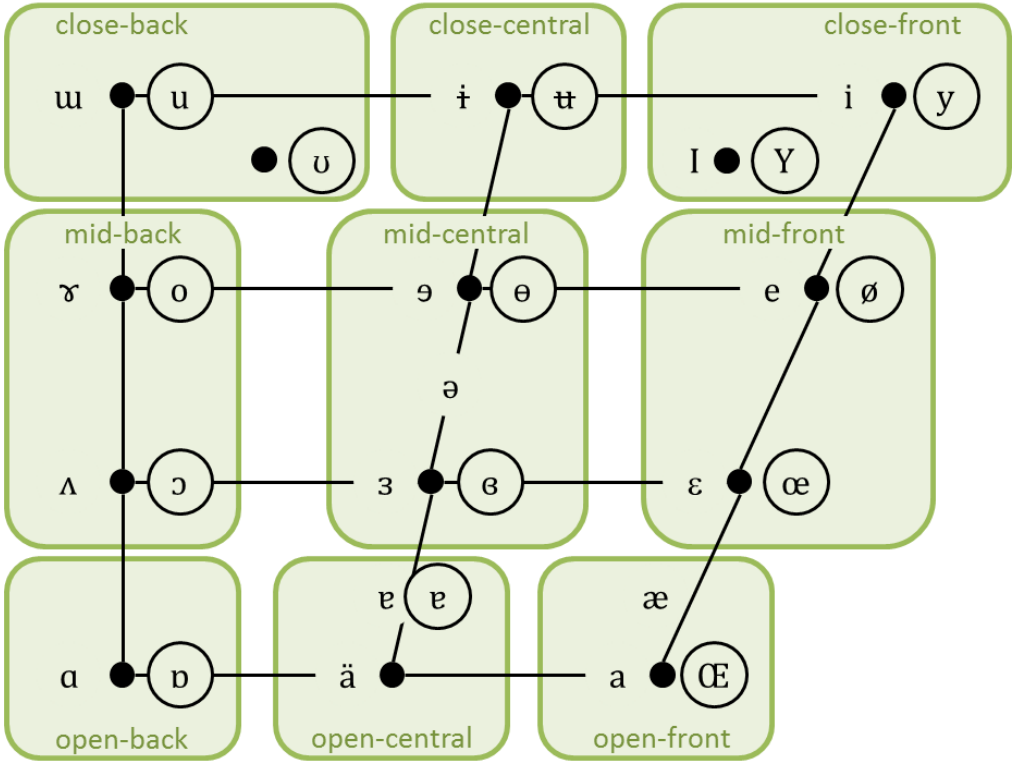
Mini-Glyphs

Advantage:
- Useful for detailed observation and external memorization of the phonetic dynamics of a poem at the level of phonemes and words.

Disadvantage:
- Less effective in observing the relationships between the different lines in a poem

Macro-Glyphs - Design Approach

- International Phonetic Alphabet (IPA) – to represent the sound and pronunciations.
- *x*-direction encodes the *frontness* or *backness* (i.e., which part of the tongue is raised).
- *y*-direction encodes the *vowel height* (i.e., how far the tongue is raised).
- Vowels in a circle indicates rounded vowels (*lip rounding*).



Examples:

- Heed [hiːd] – the tongue is forwards and upwards in the mouth, towards the hard palate.
- Palm[pɑːm] – the tongue is downwards and backwards, narrowing the pharynx.

Macro-Glyphs - Design Approach

Consider a line in a poem. Let L denote a multivariate time series:

$$L = \{(f_i, h_i, r_i) \mid i = 1, 2, \ldots\}$$

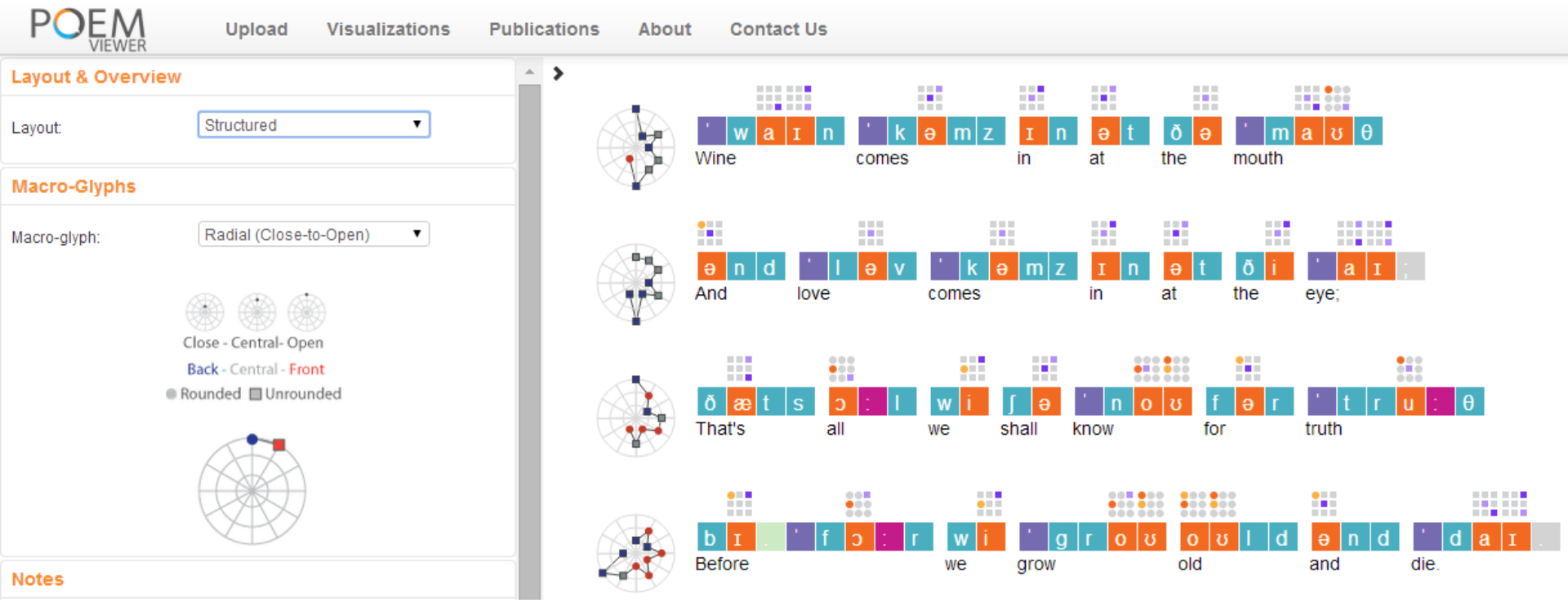
where

f_i defines the frontness (front, central, back),

h_i defines vowel height (open, mid, close), and

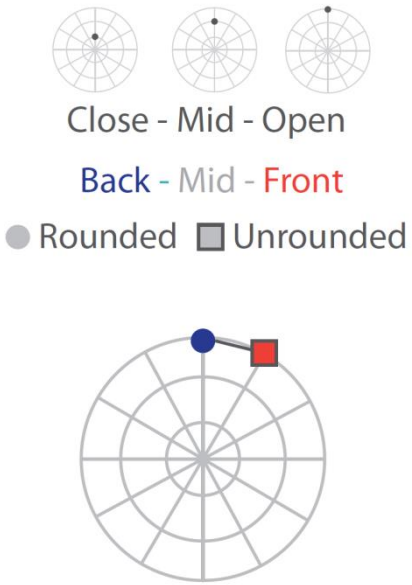
r_i defines lip rounding (rounded, unrounded).

Static Radial Glyph



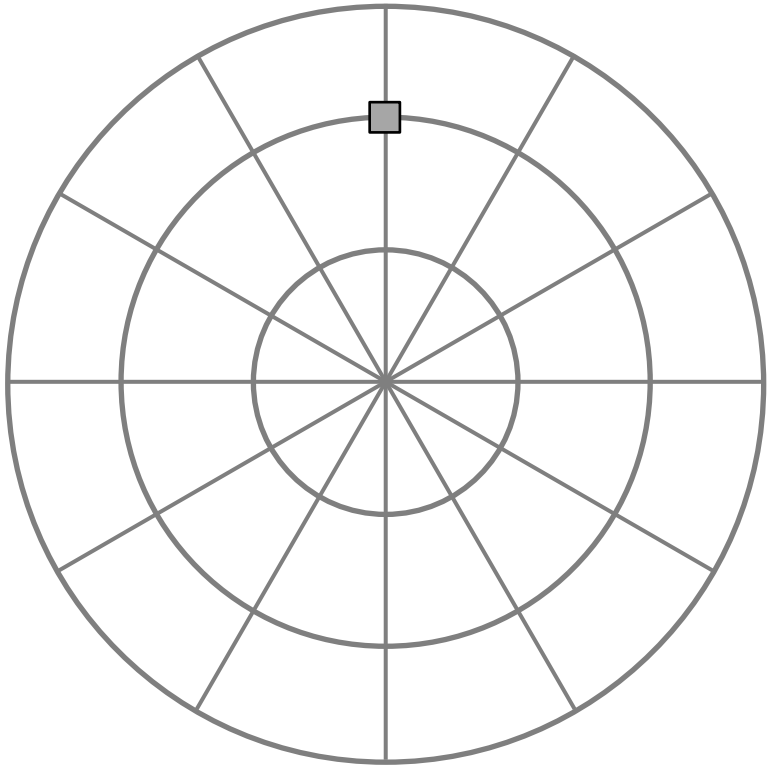
http://www.ovii.org/PoemVis/

Static Radial Glyph

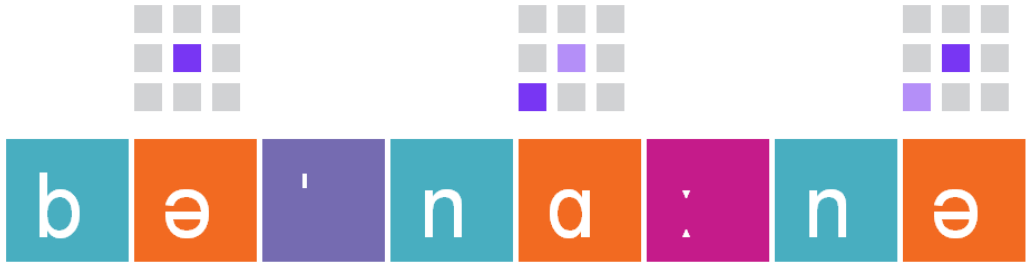


- Clockwise angular positions to show temporal ordering of vowels in a poetic line.
- As well as, three other visual channels: radial positions, color, and shape.
- Two variations for the pairing of phonemic variables and visual channels.
- Created logological link between phonemic features and colors to help memorization, i.e., B for Back/Blue, and F for Front/Fire.

Static Radial Glyph - Mapping

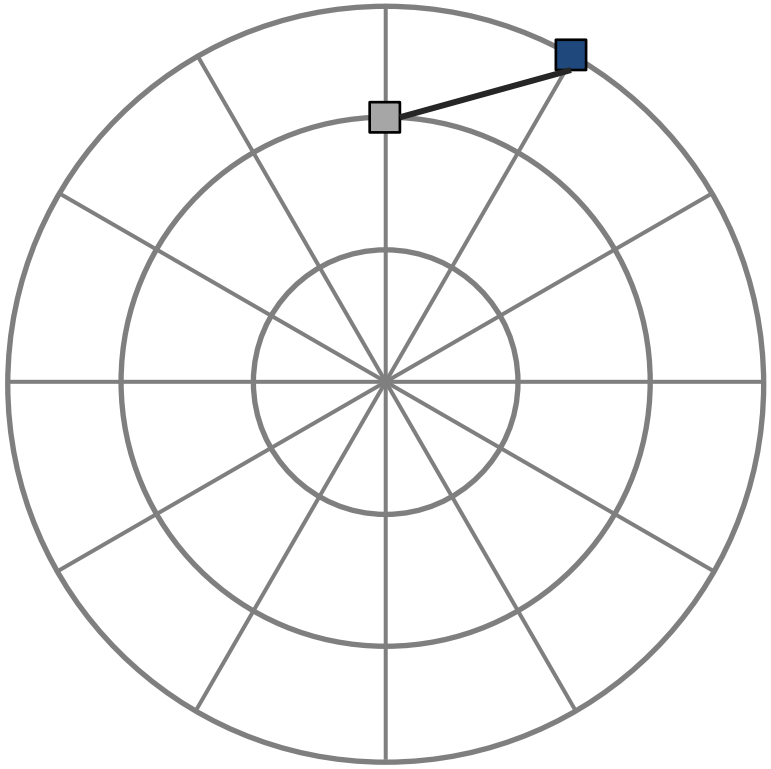


	Position	Colour	Shape
1)	Mid	Central	unrounded
2)	Open	Back	unrounded
3)	Mid	Central	unrounded



banana

Static Radial Glyph - Mapping



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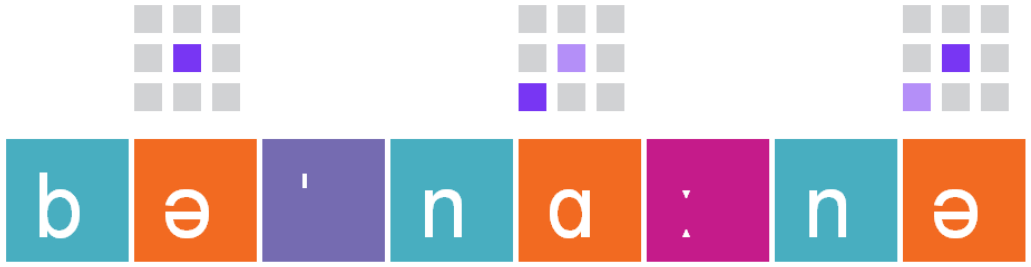

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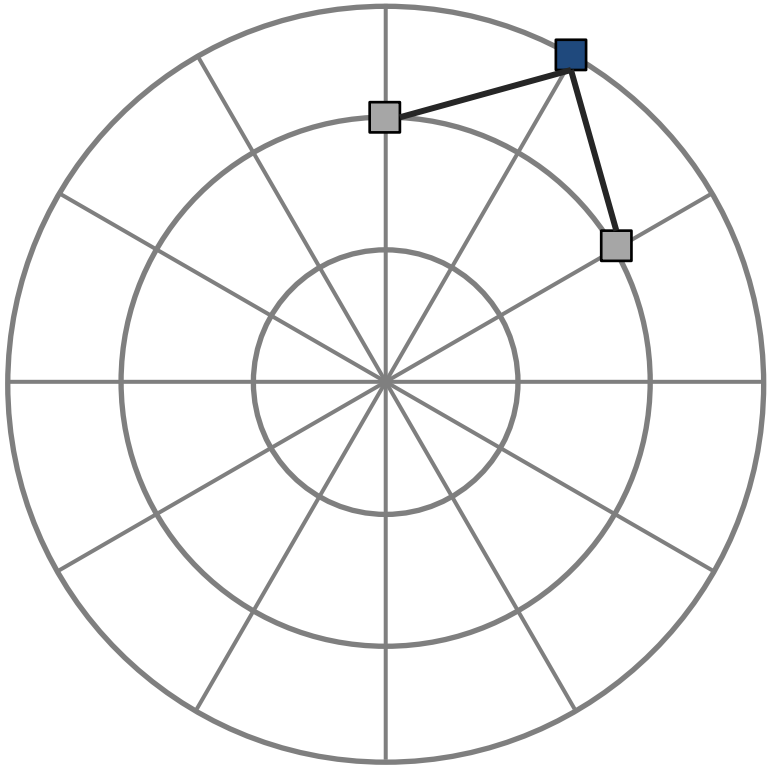
Static Radial Glyph - Mapping



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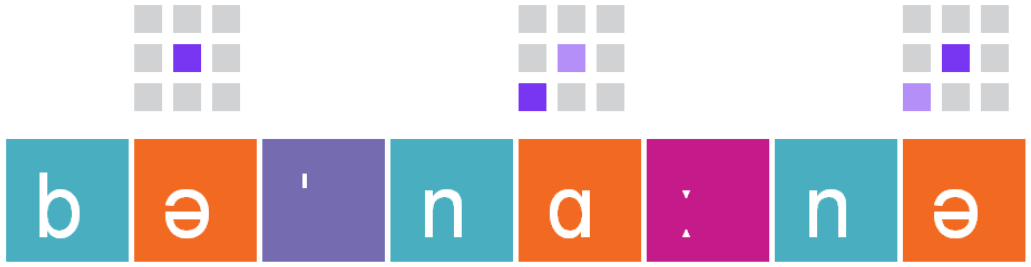

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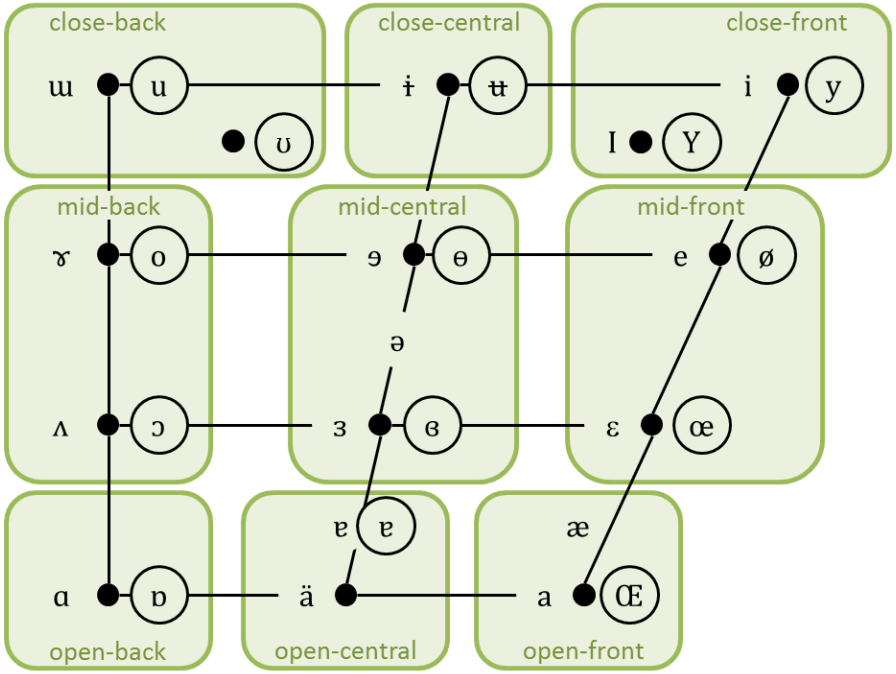
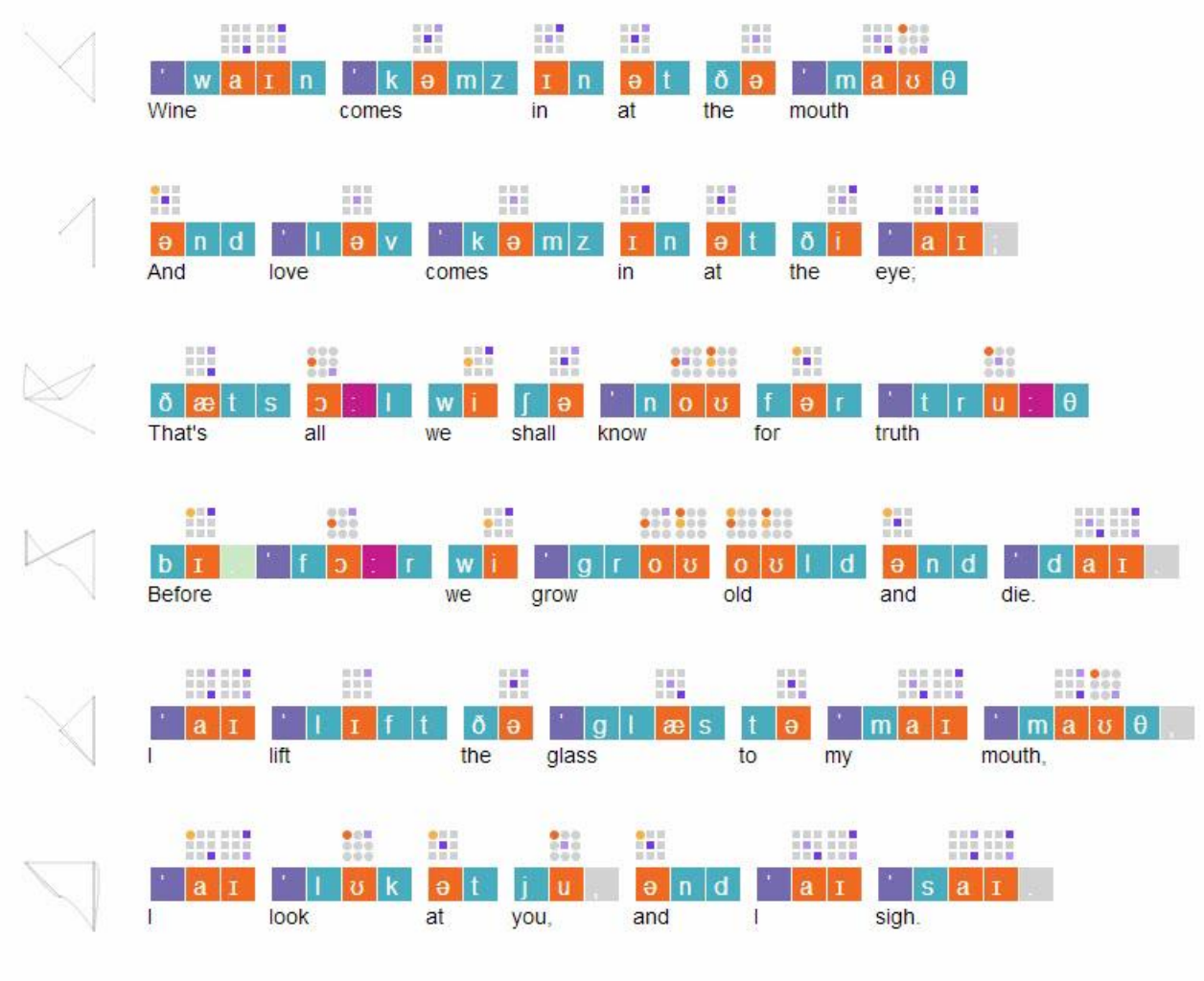
Animated Transitions

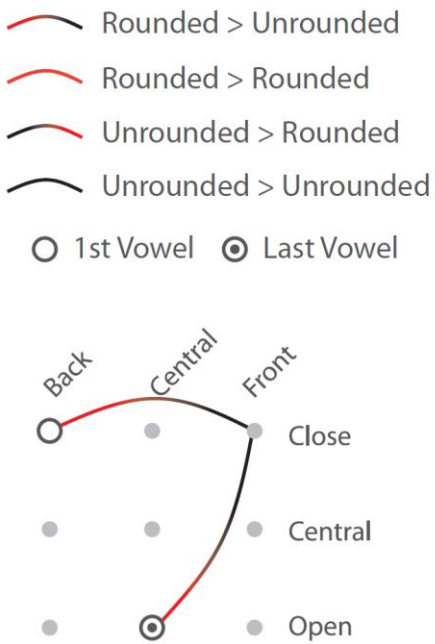


- Two variations: beat and turbulence.
- Used the abstract representation of 3 x 3 positions as the nine main reference points.
- When a vowel moves from one position to another, a transition line is drawn.

Animated Transitions

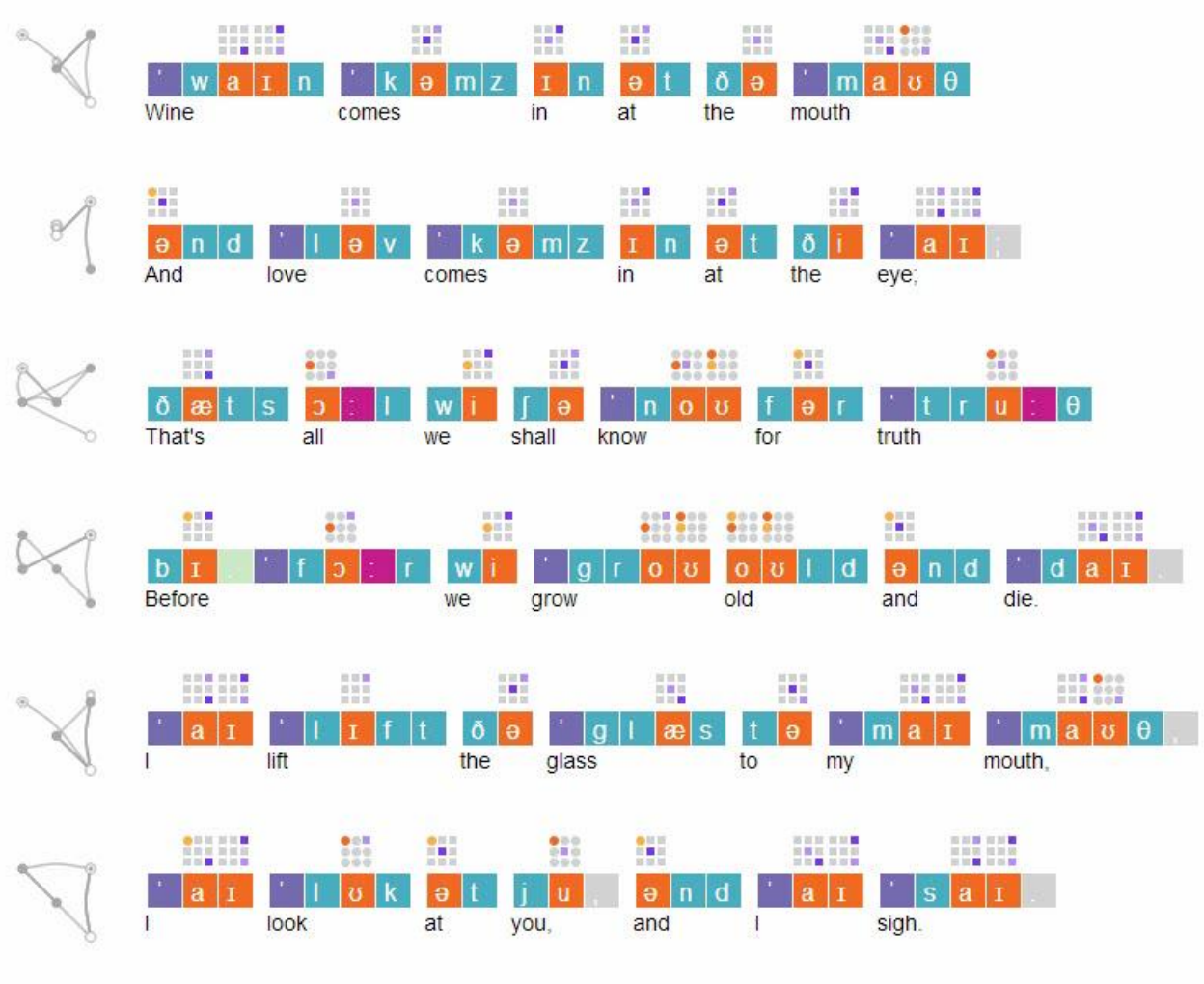


Static Transitions with Temporal Highlight



- Same 3 x 3 layout as the animated transitions, but place more emphasis on the transition lines and less on animation.
- All transition lines are static while a small marker moves along the transition lines to convey the temporal ordering.

Static Transitions with Temporal Highlight



Evaluation

- Consultation with four humanities scholars who studied poetry in the past and had experience in close reading.
- A multiple-choice questionnaire followed by free-form discussions.

Summary of Evaluation

Static Radial Glyphs	Animated Transitions	Static Trans. Temp. Highlight
Helpful in identifying similar phonetic patterns among poetic lines and differentiating dynamics and sound structures in poems.	Intuitive to observe the transitions in the flow of sound.	Intuitive to observe the transitions in the flow of sound.
	After a while, one tends to lose the tracking of the temporal ordering.	After a while, one tends to lose the tracking of the temporal ordering.

Additional comments:

- Macro-glyphs with animation are “fun to work with”, but preferred the static macro-glyphs.
- Animating macro-glyphs simultaneously caused to lose the tracking quickly.
- No single phonemic feature is important by itself. Both designs of the static designs are considered to be equally important.

Conclusions & Future Work

- Macro-glyphs to encode temporal information together with multivariate features.
- Different visual representations for observing different types of dynamics.
- Also confirms the disadvantages of animation from the perspective of analyzing phonetic dynamics in poems, while echoing the previous findings by Robertson *et al.* and Fisher.
- Future work – Visualization of temporal patterns while preserving the spatial context.

POEM VIEWER

To try out, please go to:
http://www.ovii.org/PoemVis/

The macro-glyphs can be viewed by selecting/uploading a poem and then choose “Structured” in “Layout”