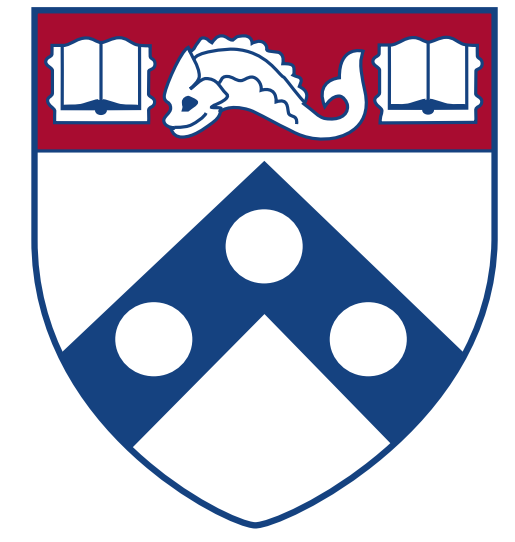


Phonology Has an Early Influence on Sound Change

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Which comes first?

Does gradient phonetic change feed subsequent categorical phonological change? Is apparent phonological change the accumulation of gradient phonetic errors in production or perception?

Test Case: /ay/ Raising

/ay/ raises in Philadelphia before voiceless consonants only, and exhibits opacity in contemporary speech.

bite **bait** **baid** bide
biting **blaitŋ** **bairtŋ** biding

Data and Model

/ay/ nucleus measurements taken from the Philadelphia Neighborhood Corpus.

	/t/	/d/	total
surface	2157	757	2914
flap	320	354	674
total	2477	1111	3588

301 speakers born between 1888 and 1991.

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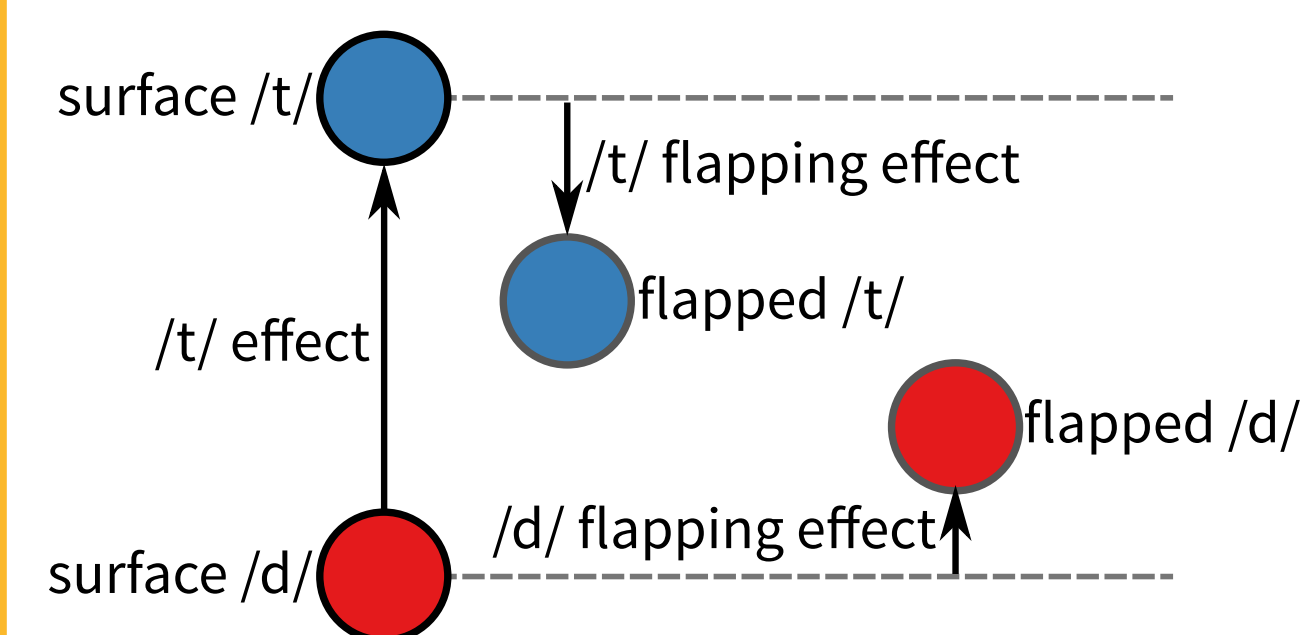
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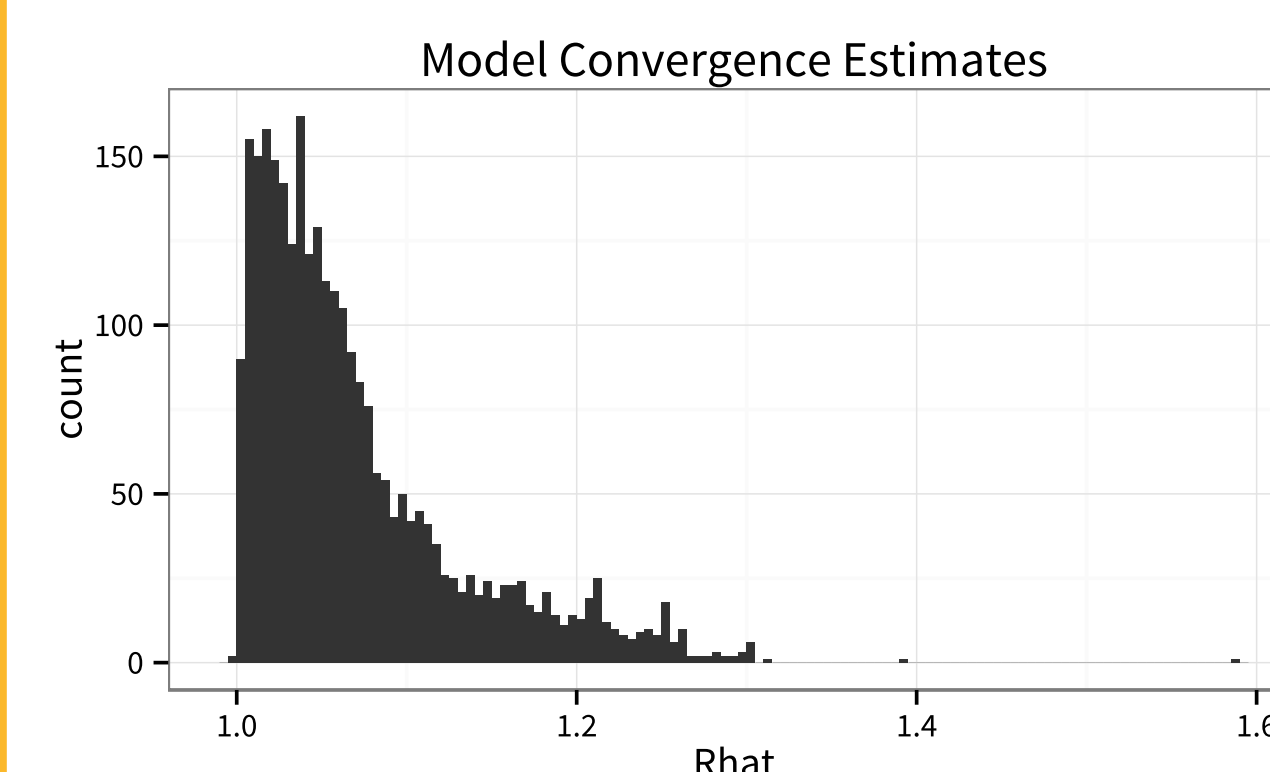
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Basic Model:

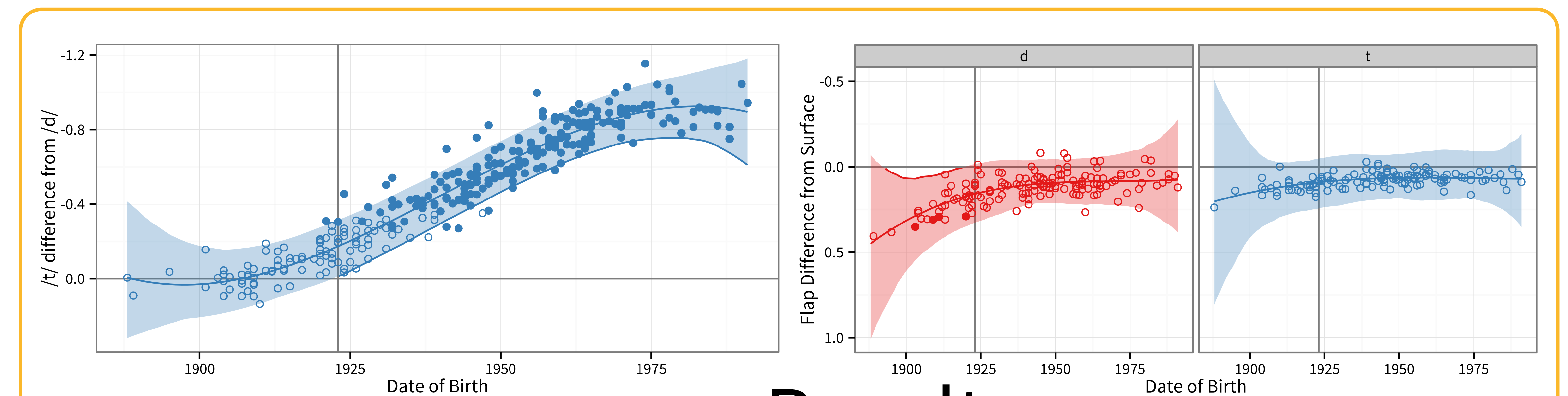
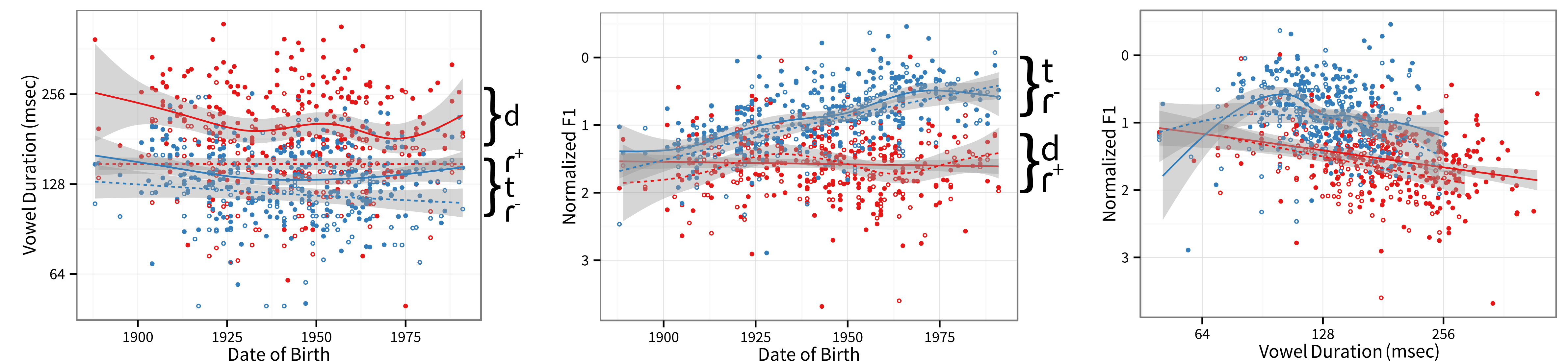


Full model includes speaker level effects, duration effects, and by-word effects.

Implemented in Stan, estimated via Hamiltonian Monte Carlo, relatively well converged.



■ t,r⁻ ■ d,r⁺



Results

It does not appear that /ay/ before flaps has ever patterned differently from /ay/ before surface /t/ and /d/. To the extent differences are observed, they run counter to predictions based on phonetic bias.

At all times in the change, /ay/ raising has occurred to a degree proportionate to the underlying voicing of the following segment, not proportionate to the phonetic properties of its context.

A model where /ay/ raising began due to phonetic biases, then generalized along phonological lines is not supported. Rather, the phonological generalization appears to be concurrent with the phonetic shift.

