

**The evolution of nasal spreading in Hoocąk**  
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Hoocąk, also called Winnebago, is an endangered Siouan language of Wisconsin and Nebraska. In the 20<sup>th</sup> century, it apparently underwent two or three interconnected changes involving nasal spreading. Drawing on impressionistic descriptions as well as audio corpora from different periods, we document and analyze these developments. Primary data sources are recordings of the Wisconsin dialect made in 1974-5 by Kenneth Miner, and in 2003-2008 by Helmbrecht & Lehmann (published in 2010).

CHANGES IN THE OUTPUT OF *r*-NASALIZATION. When the rhotic flap [r] occurs after a nasalized vowel, it becomes a nasal consonant traditionally written as [ŋ]. The earliest detailed sources (Susman 1943:16, Lipkind 1945, Miner's unpublished *Winnebago Grammar*) describe [ŋ] as a nasalized flap, phonetically [r̥̃]. However, Helmbrecht & Lehmann 2010 describe [ŋ] as a nasal stop, identical to lexical [n]. To see whether the realization of [ŋ] has indeed changed over time, we compare its duration to that of [r] and [n] in the two audio corpora. In the 1970's corpus, [ŋ] has a highly variable duration that ranges from values typical of [r] to those typical of [n] (Figure 1). The distribution of durations for [ŋ] shows no clear central tendency, suggesting there was no single canonical pronunciation. Nor does it show a bimodal distribution between flap-like and stop-like durations. This suggests that the development from flap to stop was phonetically gradient, not abrupt.

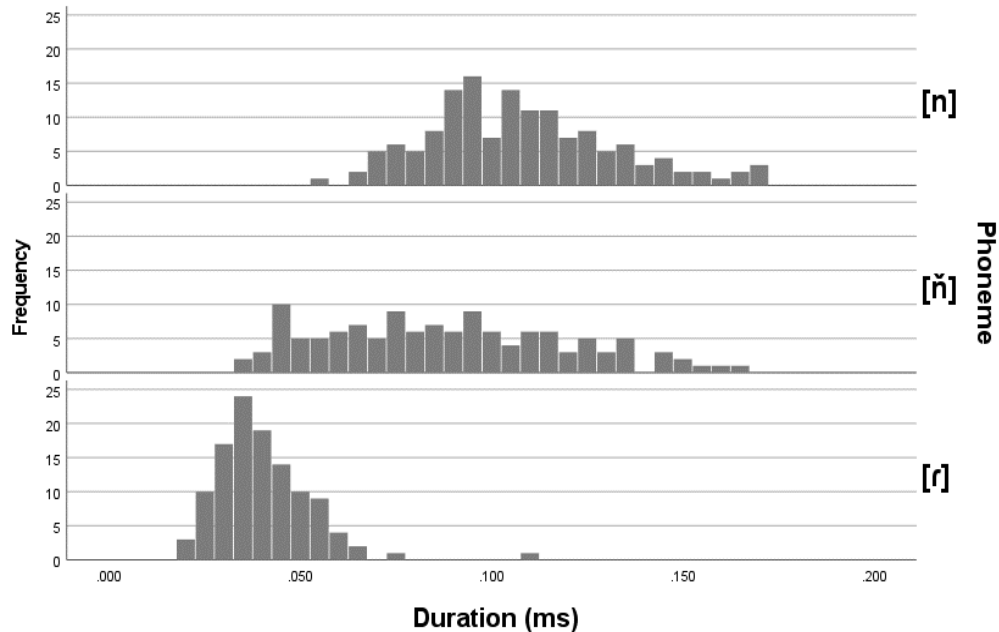
In the 2000's corpus, [ŋ] is significantly longer than [r] and not significantly different from lexical [n] in duration, supporting the claim that it has merged with surface [n].

POSSIBLE DOMAIN NARROWING. Although evidence is limited, it appears that *r*-nasalization may have ceased to apply across some morphological boundaries. For example, the word for 'tailor', composed of /wainĩ/ 'clothing' + /rucak/ 'sew', is transcribed [wainĩŋucak] by Miner but [wainĩrucak] by Helmbrecht & Lehmann. This fits with Bermúdez-Otero's claim that phonological processes tend to undergo domain narrowing over time. We could not find enough audio tokens of the relevant morphological types to compare the two time periods, but we do find one instance in the Miner recordings where *r*-nasalization fails to apply across a morpheme boundary, suggesting some role of morphological conditioning by the 1970's.

INTERACTION OF *r*-NASALIZATION AND VOWEL NASALIZATION. Hoocąk also has a second nasal spreading process, whereby the vowels /i a u/ are nasalized following a nasal consonant. The interaction of the two nasalization processes apparently changed over time. In earlier impressionistic descriptions, [ŋ] does not trigger vowel nasalization, so that an input like /nã:=ra/ 'tree-DEF' surfaces as [nã:ňa]. In Helmbrecht & Lehmann 2010, however, the same word is [nã:ňã], with the derived [ŋ] spreading its nasality just as an underlying [n] would. This represents a shift to a feeding relationship, in which *r*-nasalization applies before vowel nasalization. Auditory examination of the two audio corpora confirms this change.

IMPLICATIONS FOR LANGUAGE CHANGE. We suggest that as long as there was even a weak or variable phonetic difference between [n] and [ŋ], speakers had some surface evidence as to why one triggered vowel nasalization and the other did not. When [ŋ] became fully homophonous with [n], the interaction of *r*-nasalization and vowel nasalization became fully opaque. We suggest that this opacity triggered the change in the interaction of the processes. We frame this discussion in terms of Bermudez-Otero's proposed life cycle of phonological processes, and Kiparsky's (1968, 1971) theories of diachronic rule re-ordering.

**Figure 1: Distributions of durations for tokens of [n], [ŋ], and [r] in the 1974-5 Miner recordings.**



## References

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