

An acoustic-dynamic study of historical ł-vocalization in spontaneous Polish

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Velarization and vocalization of laterals represent prevalent forms of synchronic variation and diachronic change, frequently influenced by sociolinguistic factors [9,13]. Polish phonology, with either [ɫ] or [w] variants for /ł/ in both syllabic onset and coda, provides a typologically rare opportunity to examine the pathway of ł-vocalization, specifically by identifying the contribution of phonotactic position in triggering this historical process. In this study, we provide the first experimental documentation of the nearly extinct [ɫ]-pronunciation in spontaneous Polish, showing that the lack of acoustic distinctiveness in coda position, as highlighted by [5] for the restricted variant found in ‘stage’ Polish, is also still evident in spontaneous speech of elderly Eastern Polish speakers.

Historically, in Polish, the sociolinguistic distribution of ł-vocalization shows a change from below [6] whereby [ɫ] became [w], e.g. *łapał* ‘catch.3SG.PST’ [ɫapaɫ]>[wapaw] – initially associated with peasant pronunciation [12:71] – and eventually evolved into a socially-prestigious norm [3,14]. By the 20th century, ł-pronunciation remained only as a recessive feature in Eastern Polish varieties, and as the exclusive norm for actors, systematically taught in acting schools [4]. A recent study [5] described the acoustic features of ‘stage’ [ɫ] in literary recitation, but there is a gap in exploring the acoustic characteristics of spontaneous ł-pronunciation in Polish. To address this research gap, we conducted an acoustic study, compiling a new corpus of spontaneous speech from five speakers born between 1929 and 1933. Three Eastern Polish speakers produced [ɫ] and two Western Polish speakers realized the glide [w].

To quantify the differences between [l]/[ɫ]/[w], dynamic measurements of F1, F2, F2-F1 and F3 were calculated at 11 evenly distributed intervals spanning the entire duration of the consonant up to half the duration of the vowel. Formant trajectories were analyzed using GAMMs [11], with ‘C’, ‘V’, ‘SYLLABLE-TYPE’, ‘STRESS’ as fixed factors, a smooth for ‘INTERVAL’ and random smooths for ‘SPEAKER’ and ‘WORD’. A total of 800 tokens of CV/VC sequences were examined, where C ∈ {l,ɫ,w} and V ∈ {a,e,ɔ}, either in lexically stressed or unstressed positions.

Our results reveal that in spontaneous speech, F1 is lower for [w] compared to [ɫ] in CV ($t=2.91$, $p<.05$), but not in VC position ($t=0.81$, $p=.41$). Conversely, in the ‘stage’ Polish, [5] noted no significant difference in F1 trajectory height in any position. In CV position, [ɫ] had significantly higher F2 than [w] ($t=2.84$, $p<.05$), while in VC position, the trajectories of [ɫ,w] almost completely overlapped in the middle part except for a more concave shape of [ɫ] in comparison to clear [l] ($t=2.65$, $p<.05$), which may imply that the articulatory target is reached later [2]. The results obtained for F2-F1 indicate, in the CV position, a gradation of darkness: [l]<[ɫ]<[w] (**Fig.1**), with [ɫ] significantly higher than [w] ($t=12.35$, $p<.001$) throughout the duration of the consonant (**Fig.2**). In contrast, in VC position, [ɫ,w] do not differ significantly in terms of F2-F1 ($t=0.81$, $p=.41$), and this is consistent throughout the duration of the consonant (**Fig.2**). Our findings confirm that ł-vocalisation is favored in the VC position where the acoustic similarity between [ɫ] and [w] is the greatest [8,10]. Finally, F3 that is reported as a correlate of laterality [1,7], was found to be higher for [ɫ] than for [w] in both CV ($t=10.24$, $p<.001$) and VC position ($t=10.08$, $p<.001$). Despite a decrease in acoustic distinctiveness in F1, F2 and F2-F1, [ɫ] preserves its laterality, differentiating from [w] in VC position.

In summary, we explored the acoustic dynamics of the elusive [ɫ] variant in spontaneous elderly Polish speech showing lesser acoustic distinctiveness in coda position. Our findings

further confirm that Polish is particularly useful for identifying the contribution of phonotactic position for historical ł-vocalization.

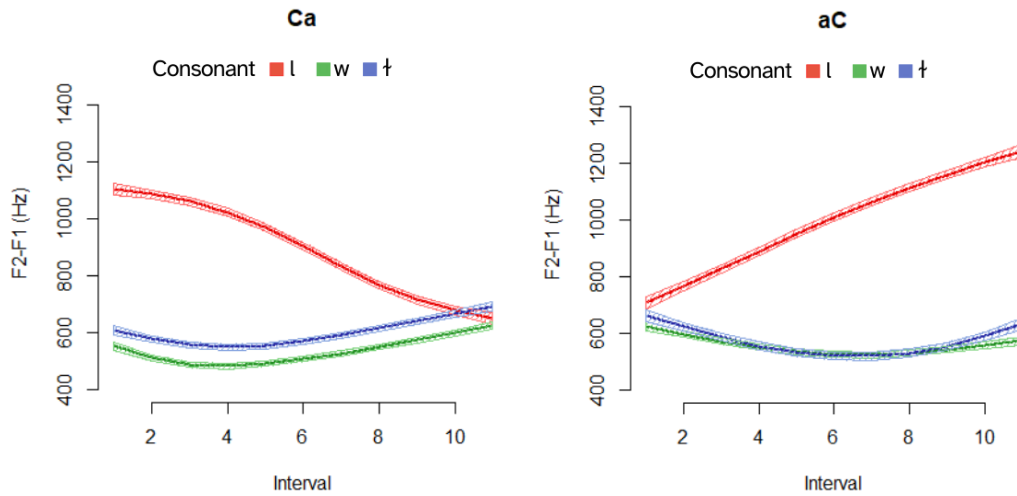


Figure 1. F2-F1 (Hz) trajectories in CV (left) and VC (right) positions where $C \in \{l, \text{ł}, w\}$ and $V \in \{a\}$.

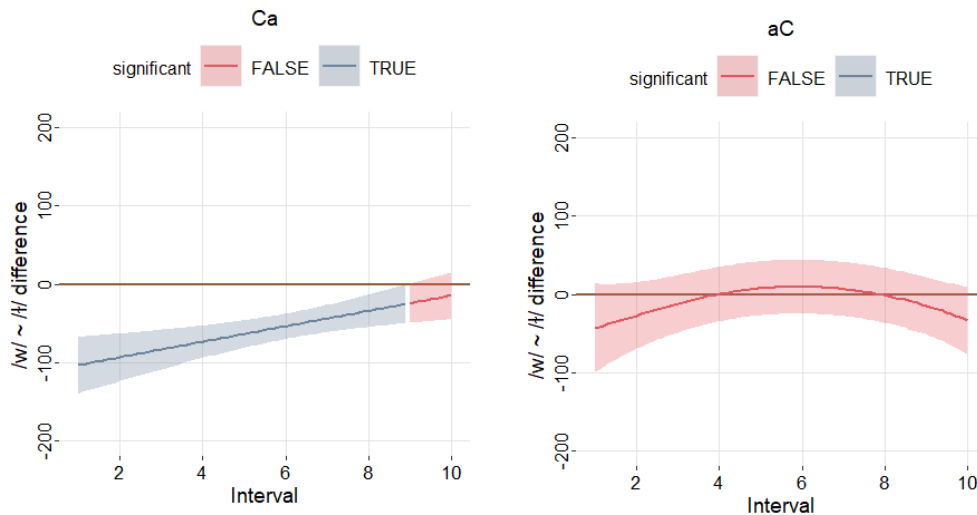


Figure 2. GAMM difference plots comparing trajectory height for [w]/[ł] in CV (left) and VC (right) positions.

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