

Tonogenesis in Afrikaans: Age and Gender Differences in Cue Weighting

Alexandra Pfiffner
Georgetown University

Afrikaans historically contrasted prevoiced /b, d/ and voiceless unaspirated /p, t/ [1], but recent research has found that underlying voiced obstruents are frequently realized as their voiceless counterparts, especially in younger generations [2]. Coetzee and colleagues [2] compared productions from women ages 20-23 and 40-60 and found significant differences in devoicing rates and F0 ranges; younger women devoiced nearly twice as often and had an F0 range that was 25 Hz higher than the older population. In a perception task with a young female speaker, all participants relied on both F0 and prevoicing to identify the word-initial plosive. However, when the two cues conflicted, older participants relied more on prevoicing. Plosive voicing in Afrikaans is thus undergoing cue-transfer, as different generations are more heavily weighing different cues both in perception and production. However, a complete picture of initial plosive voicing in Afrikaans calls for data on men's productions as well as more perception judgments, as we might expect perception to vary depending on a speaker's social characteristics [3, 4, 5]. The current study fills that gap with a perception and production experiment with 34 native speakers. Participants were split into two gender-balanced age groups (ages 20-24; n=20 and 60-83; n=14).

Perception task stimuli were continua varying in F0 and prevoicing: /pad/-/bad/ ('road', 'bath') and /tal/-/dal/ ('quantity', 'valley'). Four native speakers of Afrikaans produced the tokens: two males and two females, with one older and one younger speaker in each pair. Continua were constructed using a voiceless token as the base. There were four types of continua: (1) no prevoicing and F0 varying, (2) full prevoicing and F0 varying, (3) ambiguous F0 and prevoicing amount varying, and (4) F0 and prevoicing amount varying, and in conflict (i.e. high F0 paired with 100% prevoicing). Each continuum had five steps.

Participants underwent a two-alternative forced-choice task presented in PsychoPy [6], where they heard a stimulus word and had to choose if they heard *pad* or *bad*, or *tal* or *dal*. Stimuli were blocked by speaker, and participants were given the age and gender of each speaker to test if they were listening for different cues depending on speaker demographics. The order of speaker blocks was randomized, as was the order of all tokens. The experiment was conducted entirely in Afrikaans in Potchefstroom, South Africa.

Results show that in the absence of prevoicing, F0 is a strong cue for all participants, as tokens with the lowest F0s were identified as "voiced" and the highest F0s as "voiceless" (Figure 1). At the highest F0s, older speakers' productions are perceived as less "voiced" than younger speakers, and specifically the older population relies least on F0 when judging the older male speaker (Figure 1). Overall, when any amount of prevoicing is present, it becomes the dominating cue and overrides F0 in all participant and speaker demographic combinations (Figures 2 and 3).

In the production task, participants read a randomized word list and paragraphs containing the token words in balanced phonological environments. Preliminary results from the word list (4 speakers, one of each demographic) show differences in age and gender. Younger participants have a much higher devoicing rate (81% for a female participant; 86% for a male) in comparison to older participants (22% and 17%, respectively). Female speakers produce larger F0 differences between plosive categories (average of 44 Hz for the younger participant and 32 Hz for the older) in comparison to male speakers (average difference of 13 Hz and 19 Hz, respectively). Thus, there is evidence that cue weights are not changing uniformly as the language undergoes tonogenesis. There are differences in perception and production, and by speaker and listener demographics.

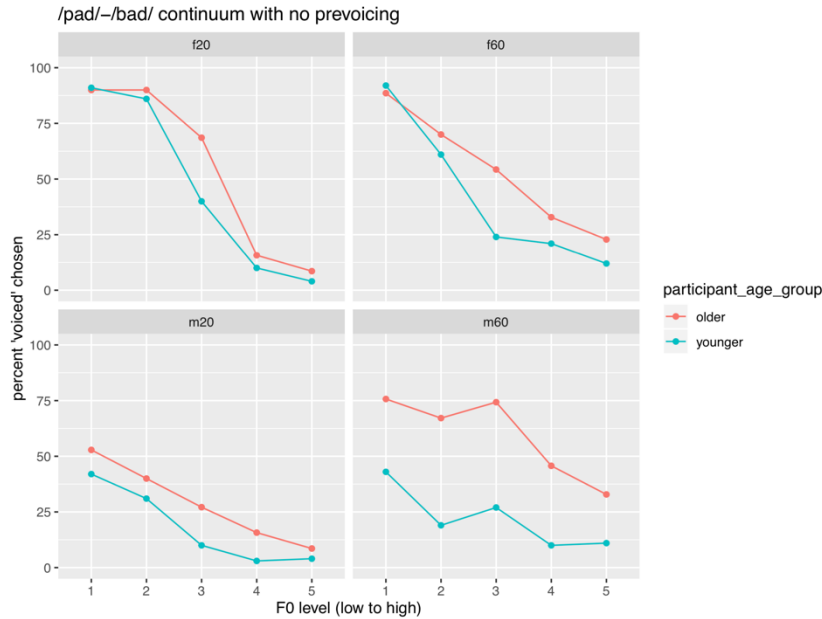


Figure 1 (left): /pad/-/bad/ continuum showing effects of F0 by participant age group and speaker identity

(f20 = younger female speaker; f60 = older female, m20 = younger male, m60 = older male)

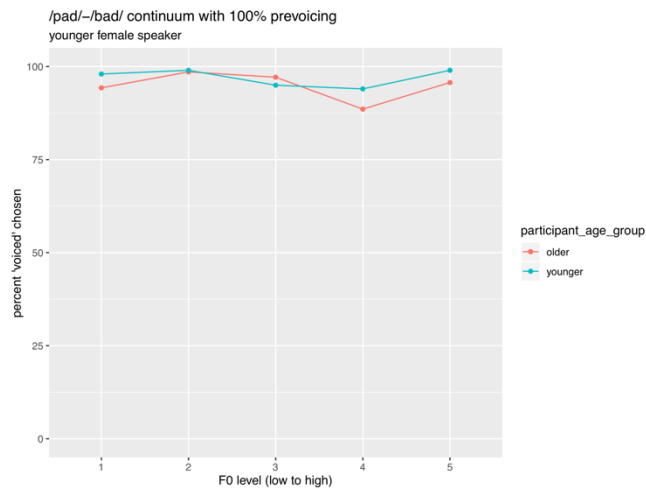


Figure 2: /pad/-/bad/ with 100% prevoicing

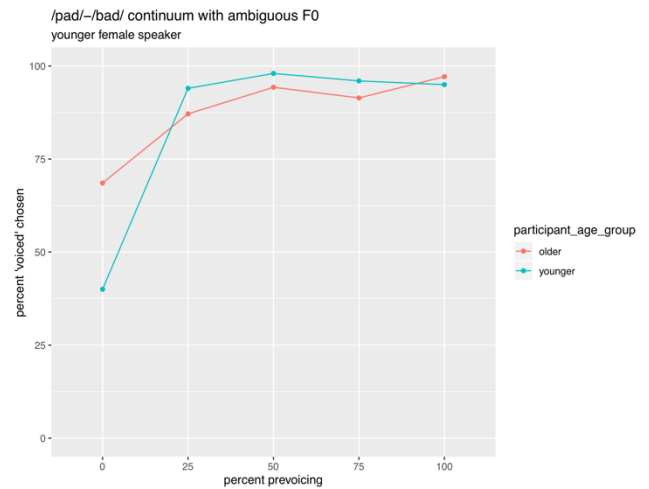


Figure 3: /pad/-/bad/ with ambiguous F0

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