Aerodynamic voicing constraints in stops: from Wolfgang von Kempelen to John Ohala

During the oral closure of voiced stop consonants, e.g. [b d g], supra-glottal air pressure increases and leads to a reduction of the trans-glottal air pressure difference – and hence to devoicing. Typically, voicing ceases after a much shorter time span than the closure phases of fully voiced stops (Ohala & Riordan 1979). It is assumed that the vocal tract is enlarged to maintain a trans-glottal flow and delay the cessation of voicing. An actively controlled enhancement of the vocal tract can be achieved for instance by lowering the larynx or by lowering the tongue body. A passive enlargement of the vocal tract happens through the compliance of tissue (Ohala & Riordan 1979, Ohala 1993). Exactly this effect can be obtained with the historical speaking machine developed by Wolfgang von Kempelen (1791). A construction that consists of additional ‘plosive bellows’, located directly beneath the ‘nasal cavity’, and a small tube that links both cavities (nasal cavity and plosive bellows) enables the above-mentioned compliance effect. This mechanism allows a better understanding of the aerodynamic voicing constraints in stops in general. It also provides an explanation for full and partial devoicing in stops across languages and dialects – an account that is not often considered in phonetics and phonology.

References


