Pharyngeals in the language acquisition process

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Many languages of the world exhibit features that can be classified in terms of 'laryngeal quality' – a subset of 'voice quality'. The acoustic cues of these features illustrate an extensive range of use of the pharyngeal resonator and the laryngeal constrictor mechanism (controlling changes from the glottis through the aryepiglottic folds). The pharyngeal/laryngeal articulator has also been identified as the principal articulator that infants first start to control as they test and practice their phonetic production skills from birth through the first several months of life. Elements of the fine control of laryngeal constriction have been observed laryngoscopically in over 20 languages and modelled to illustrate the parameters of movement available in the laryngeal/pharyngeal space. Figure 1 illustrates the multiplicity of parameters of phonetic adjustment that are available in the pharyngeal region, within what we call the 'Laryngeal Articulator'. This region is the same primary area that infants have at their disposal (but in a more compact form, and with far fewer lingual parameters) when first testing their vocalization instrument.

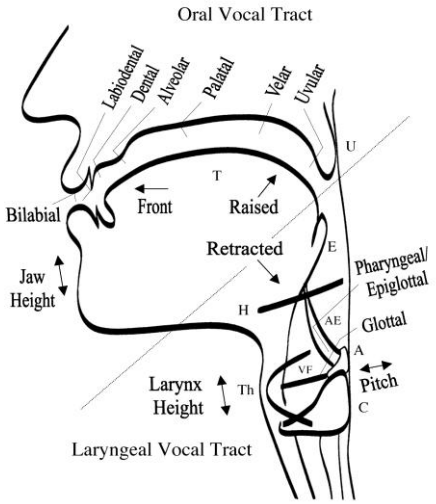

Figure 1: *The 'two-vocal-tract' reconceptualization of the standard articulatory model of the vocal tract (minus the nasal tract) with jaw height determining close/open vowel setting at the front, and tongue raising/retracting determining vowel quality at the back. T, tongue; U, uvula; E, epiglottis; H, hyoid bone; AE, aryepiglottic folds; A, arytenoid cartilages; VF, vocal folds; Th, thyroid cartilage; C, cricoid cartilage. This figure is reproduced from Esling's original 2005 work in the* Canadian Journal of Linguistics.

The auditory/acoustic cues generated in the pharynx are the same elements of sound production observed in newborn infants from a range of language environments. The infant vocalization data illustrate that laryngeal quality is primal, that the control of the acoustic cues of speech originate in the pharynx, and that the acquisition of the ability to produce manners of articulation spreads from the pharynx in a process that parallels and complements the ability of infants to discriminate speech sound categories auditorily/perceptually.

Our research into the earliest vocalizations by infants in a research project including English (Victoria), French (Paris), Arabic (Morocco), and Bai (China) shows that (1) speech begins in the pharynx, (2) the production of phonation begins with laryngeally constricted settings, (3) infants explore their phonetic production capacity by employing (a) 'phonetic alternations' and (b) 'pharyngeal priming'. Data from the Infant Speech Acquisition (InSpA) Project typify instances of 'phonetic play' that demonstrate how infants systematically acquire basic control over the speech mechanism and over the arrays of place and manner of articulation during their first year of life.

These results provide evidence for universal and language-specific patterns in the use of laryngeal constriction in the first year of life. In the first months of life, all infants produce universally constricted voice quality settings. Over the course of the year, as infants systematically explore their evolving phonetic capacities, unconstricted settings make up an increasing proportion of their vocal repertoires. Within this general pattern, the distribution of laryngeal constriction in the infants' utterances may vary according to laryngeal features exploited in the infants' ambient language. It is estimated that, within the first year of life, infants have learned the major parametric oppositions of laryngeal constriction vs. openness, glottal closing vs. glottal openness, glottal shortening vs. glottal stretching, larynx raising vs. larynx lowering, and the intermediate degrees required for contrasting manner of articulation, including differing requirements for airflow. The performance data suggest that one-year-old infants can exert paired control over these parameters, such that they have the tools at their disposal to produce the phonetically contrastive elements that occur in phonologies that exploit the pharynx, as in Semitic or in Tibeto-Burman languages. Notwithstanding, of the range of prelinguistic vocalizations produced by infants, babbling behaviour is the most likely to reflect emergent phonological properties and to exhibit cross-linguistic differences.

To summarize, we have identified the pharynx as the origin of earliest speech vocalization and the site of the earliest acquisition of manners of articulation. We have found evidence of phonetic alternation and pharyngeal priming as active strategies in the speech acquisition process. We have identified a preference for oral articulations over laryngeal units as babbling progresses. Our initial hypothesis that pharyngeal sounds will proliferate linearly when the ambient language contains those sounds (as in Semitic or in Tibeto-Burman languages) is only weakly supported by the evidence of laryngeals in late vocalizations in Arabic and in Bai but not in the babbling of either of these languages. Our new working hypothesis is that pharyngeals are used first, that oral sounds are preferred in babbling, and that pharyngeals follow a hierarchy of 'reacquisition' in the second 12 months of life.