## Abstract

## Rehabilitative Speech Computer Game Calibration Using Empirical Characterizations of Articulatory Working Space (AWS)

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The application of interactive visual feedback and game mechanics to kinematic speech motor rehabilitation has recently been developed (Shtern, Haworth, Yunusova, Baljko & Faloutsos, 2012). This system transduces raw kinematic tongue data into computer game controls, essentially transforming electromagnetic articulography (NDI Wave Inc) into a game controller. In this paper, we describe a technique for mapping the game player's Articulatory Working Space (AWS) to playable game world space. The parameters of the technique are based on empirical data of AWS, as obtained from a specifically designed elicitation study that used a phonetically comprehensive passage to elicit the fullest range of tongue movements. The mapping technique entails the identification of the extrema of the AWS in order to generate scaling factors for each of the three dimensions of tongue movement in speech. These scaling factors and the centroid of the motions form parameters used to fit incoming kinematic data from the EMA data to a known game world space. Preliminary results indicate that either cumulative or statistical methods should be used to generate the parameters. The discussion examines the viability of this approach for mapping articulatory motions to player motions and for the use of real-time interactive feedback for rehabilitation more generally.