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**Statistical identification of critical, dependent and redundant articulators**

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An automatic method for identifying critical, dependent and redundant roles in speech articulation is presented. Critical articulators are identified using the Kullback-Leibler divergence between phone-specific and model pdfs, which are initialised to the grand pdfs for each articulator. Model pdfs of critical and dependent articulators, those significantly correlated with the critical ones, are updated accordingly for both 1D and 2D cases, as long as the divergence exceeds the threshold. Those unaffected are termed redundant. Algorithm performance is evaluated on the MOCHA-TIMIT database by comparison with phonetic features. Results are also given for an exhaustive search, and principal component analysis of articulatory fleshpoints. Implications of being able to extract phonetic constraints automatically from articulatory recordings are discussed.