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Hearing the tongue and lips of vowel gestures : a new differential paradigm

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It is an old question to know to what extent a listener can recover the articulatory dimensions of a speaker's gesture. In the case of vocalic configurations, a number of experiments have been done on expert phoneticians, showing that vowel height can be reasonably well estimated from the sound, but the front-back and lip rounding dimensions are much less well recovered. However, almost nothing has been done on naive listeners, due to the difficulty to perform absolute estimations in the lack of explicit phonetic knowledge. In the past years, we have developed an original paradigm, exploiting differential rather than absolute estimations. We show that French listeners, even naïve, are able to discriminate to a certain extent which vowel in a given pair has a higher vs. lower or more front vs. more back tongue position, or more or less rounded lips. From these data, we have elaborated an algorithm enabling to estimate what are the internal representations of vowel height, frontness and rounding, and correlated these representations with acoustic parameters, F1, F2-F1 and F'2 in Barks appearing to play a key role in the auditory recovery of these three motor dimensions.