

## **Examining feedback and feedforward speech motor control in acquired apraxia of speech using auditory F0 and F1 perturbation.**

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### **Abstract**

**Purpose:** Apraxia of speech (AOS) has explained as a feedforward motor control disorder, impairing learning/activation of predictive speech motor commands.

Alternate hypotheses are that AOS is a feedback control, or both feedback and feedforward control disorder. These hypotheses are examined using established pitch (F0) and first formant (F1) perturbation protocols.

**Method:** Experiment I included 20 controls and 12 AOS cases. F0 was perturbed up/down by 100 cents during vocalization of “ah”. Response magnitude and latency were measured. Experiment II included 10 controls and 9 AOS cases. F1 was measured in 3 C<sub>1-3</sub>V<sub>1</sub> words across five phases: (1) BASELINE *with* masking: normal feedback with noise-masked trials interlaced, (2) BASELINE *without* masking, (3) RAMP: upward F1 perturbation incremented to 30%, (4) HOLD: 9 trial blocks, alternating 15 trials with 30% F1 perturbation and 15 masked trials, and (5) END: masking only.

**Results and Discussion:** Exp I: Compensatory response to F0 perturbation in AOS was not significantly different to controls, supporting intact feedback control. Exp II: AOS cases were significantly more variable than controls in BASELINE *without* masking but not in BASELINE *with* masking. Controls demonstrated compensation but return to baseline in the END phase. F1 variability complicates interpretation of AOS perturbation response.