

The Effect of Feedback Frequency on the Treatment of Acquired AOS

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Pathogenesis of Acquired AOS

Current research strongly supports the notion that AOS is a disorder of motor control (Itoh & Sasaruma, 1987; Hageman, Robin, Moon & Folkins, 1984; McNeil, Robin & Schmidt, 1997; Clark & Robin, 1998)

Specifically, AOS is related to difficulty programming and/or planning kinematic patterns used during speech production (McNeil, Robin, & Schmidt, 1997)

Thus, application of principles of motor learning to treating AOS is a logical step in the clinical process.

Principles of Motor Learning

Motor learning: Processes that underlie the changes in a capability for movement

Which variables affect:

- Acquisition (i.e., temporary performance enhancement during treatment or practice)
- Learning (i.e., long-term retention and generalization of improved performance)

E.g.:

- Target complexity
 - complex (e.g. clusters) vs. simple (e.g. singleton consonants) (e.g. Maas et al., 2002)
- Practice sequence
 - random (practice multiple stimuli in random order) vs. blocked (practice one stimulus before moving on the next) (e.g. Li & Wright, 2000; Schmidt & Bjork, 1992; Wright et al., 2004)
- Frequency of feedback
 - low (known to enhance error detection and promote increases in processing load) vs. high (known to reduce processing load during learning) (e.g. Bruechert et al., 2003; Wulf et al., 1993)

Principles of Motor Learning Applied to Speech

- Simple **Complex**
 - Maas, Barlow, Shapiro, & Robin (2002)
 - Start with complex
- Blocked **Practice**
 - Knock, Ballard, Robin, Schmidt (2000); Adams & Page (2000)
 - Random practice
- High-frequency **feedback**
 - Clark & Robin (1998); Adams & Page (2000); Adams & Page (2002) (summary feedback)
 - Reduced-frequency feedback

Current Study

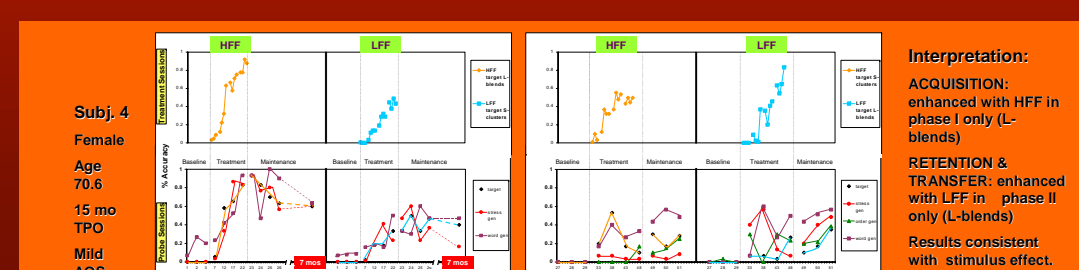
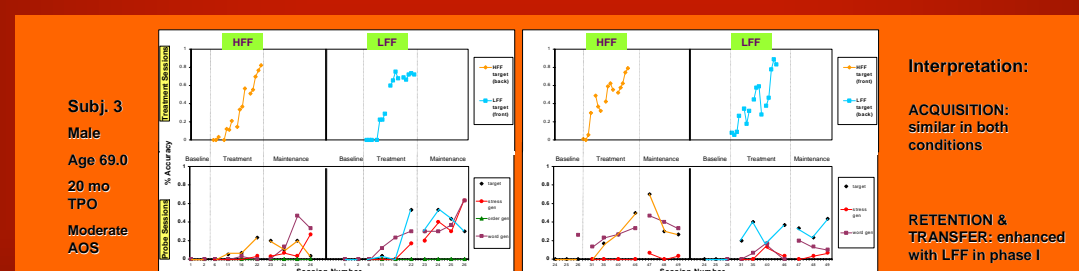
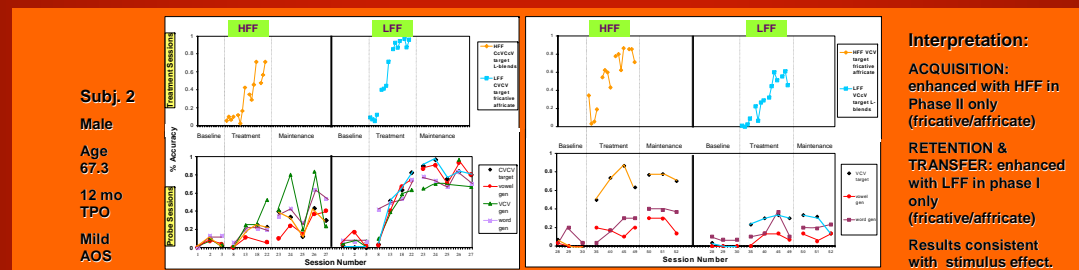
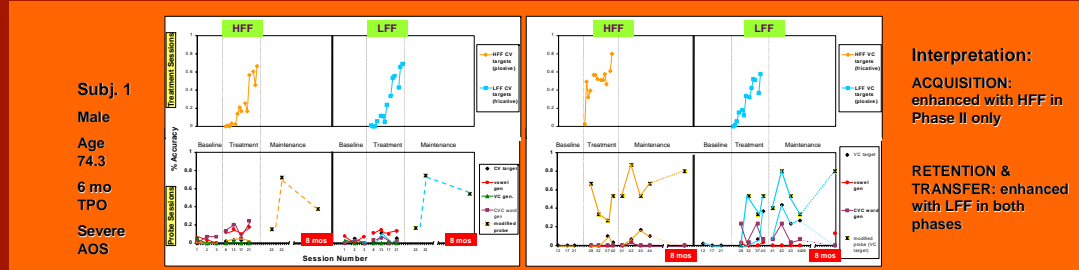
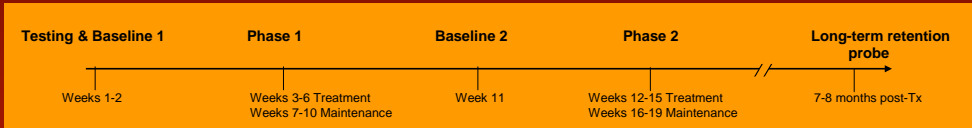
- Question:
 - What is the effect of relative feedback frequency on the learning of speech skills in adults with AOS?
- Predictions (based on limb literature):
 - High-frequency feedback (HFF-100%) will promote temporary performance enhancement but interfere with long-term retention and transfer of speech skills
 - Low-frequency feedback (LFF-60%) will best promote long-term retention of treated speech sounds and generalization to similar but untreated behaviors.

Design

- Single subject
- Multiple baseline across behaviors
- Alternating treatment—both conditions each session

Treatment Procedures

- Frequency: 4x/week
- Duration: 4 weeks (14-16 sessions total)
- Intensity: 90 minutes
- Probe sessions 1x/week

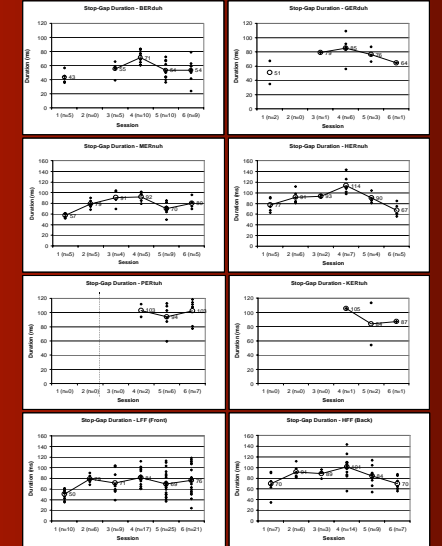


Example:

	Stimulus	-Condition	Practice	Pre - Practice	Practice
1 st session half	LFF	Fricative	Phonetic Placement Therapy	Phonetic Placement Therapy	20 productions of each target elicited randomly, feedback on 60%
2 nd session half	HFF	Fricative	Phonetic Placement Therapy	Phonetic Placement Therapy	20 productions of each target elicited randomly, feedback on 100%

Acoustic Analyses: Stop-gap duration

- Subject 3 only
- Correct items only, from Maintenance Phase 1 (session numbers 1 and 2) and from Maintenance Phase 2 (session numbers 3-6)
- Inter-rater reliability (on 18% of data): 88% within 10 ms., $r = .96$



Summary

- HFF was not consistently associated with better temporary performance enhancement than LFF during speech skill acquisition
- LFF was associated with enhanced long-term retention and/or generalization in at least 2 subjects (severe and moderate) and may be a factor in the remaining 2 cases (mild)

Conclusions

- Reduced feedback frequency may enhance retention and generalization of speech skills in adults with AOS
- Acquisition performance does not predict retention and generalization, the hallmarks of true learning
- Independent of feedback manipulations, these data contribute to the growing body of literature supporting the efficacy of treatment for chronic AOS

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Acknowledgements

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