

Implementation Of An In-The-Ear Device To Alleviate Stuttering: Research Evidence

Andrew Stuart & Joseph Kalinowski
East Carolina University
Greenville, NC, USA



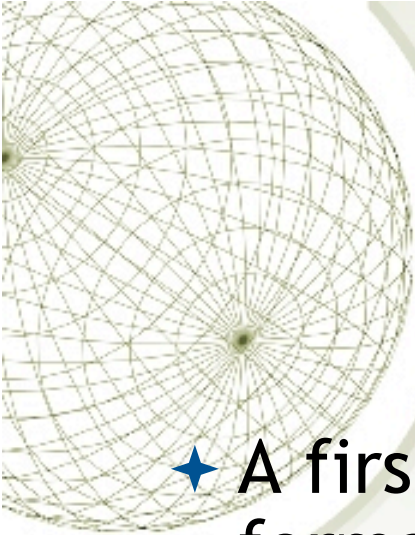
Our initial research drive...

- ★ Limitations of traditional “speech restructuring treatments”.
 - ✦ Carry-over of fluency from therapy to daily living is often difficult and relapse is common.
 - ✦ Speech, while initially stutter-free, is often unnatural sounding.



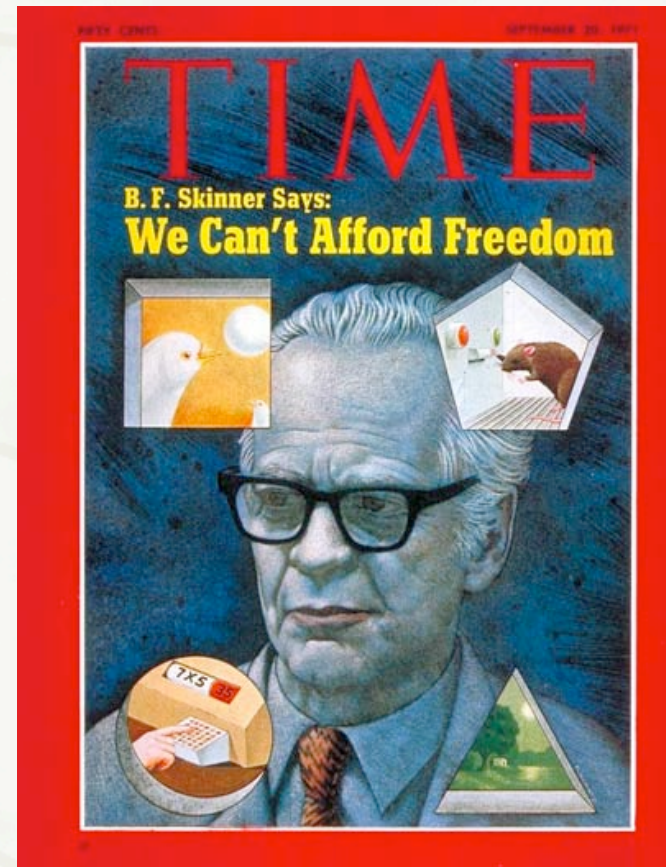
★ “A sense of invulnerability to stuttering.”

◆ Kalinowski (2003)



★ A first principle not formally recognized by scientific methodologists: When you run onto something interesting, drop everything else and study it.

★ B.F. Skinner



EFFECTS OF ALTERATIONS IN AUDITORY FEEDBACK AND SPEECH RATE ON STUTTERING FREQUENCY*

JOSEPH KALINOWSKI, JOY ARMSON, MAREK ROLAND-MIESZKOWSKI, ANDREW STUART

Dalhousie University

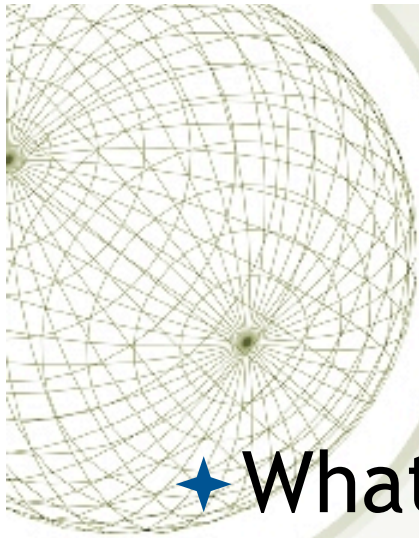
and

VINCENT L. GRACCO

Haskins Laboratories

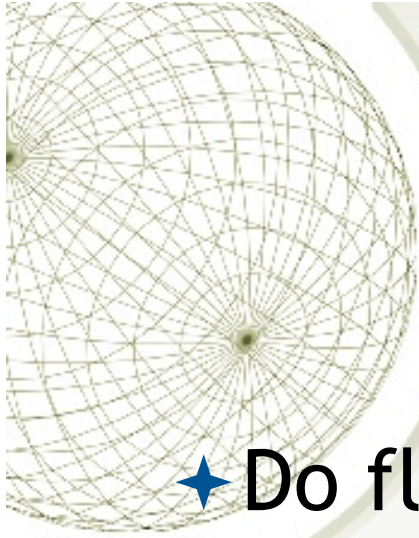
This study investigated the effects of altered auditory feedback on stuttering frequency during speech production at two different speech rates. Nine stutterers, who exhibited at least 5% dysfluency during a reading task, served as subjects. They read eight different passages (each 300 syllables in length) while receiving four conditions of auditory feedback: nonaltered, masking, delayed, and frequency altered. For each auditory feedback condition, subjects read at both a normal and a fast rate. Results indicated that stuttering frequency was significantly decreased during conditions of delayed and frequency altered auditory feedback at both speech rates ($p < 0.05$). These findings refute the notion that a slowed speech rate is necessary for fluency enhancement under conditions of altered auditory feedback. Considering previous research and the results of this study, it is proposed that there may be two interdependent factors that are responsible for fluency enhancement: alteration of auditory feedback and modification of speech production.

Key words: stuttering, fluency enhancement, auditory feedback, speaking rate



Research Objectives

- ★ What are the optimal AAF parameters that induce the greatest reduction in stuttering frequency?
 - ✦ Armson & Stuart, 1998; Hargrave et al., 1994; Kalinowski et al., 1993, 1995, 1996; MacLeod et al., 1995; Stuart et al., 1996, 1997



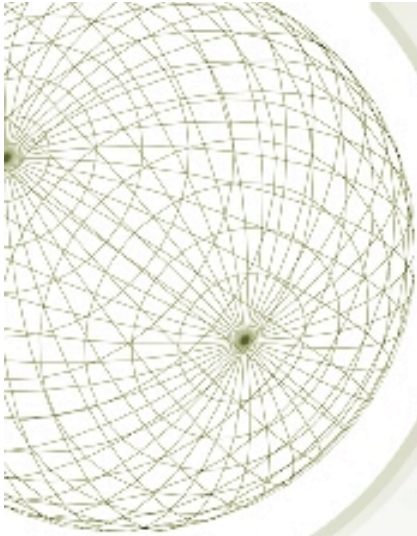
★ Do fluency effects of AAF generalize from the lab to situations of daily living and is speech natural?

✦ Armson et al., 1997; Kalinowski et al., 1999; Zimmerman et al., 1997



Impetus For Device Development

- ◆ Effects are spontaneous without effort.
- ◆ Speech is natural sounding.
- ◆ Effects are seen in reading and conversation.
- ◆ Effects are evident monaurally regardless of ear.
- ◆ Effects are observed in public speaking and on telephone.



United States Patent [19]

Rastatter et al.

[54] THERAPEUTIC DEVICE TO AMELIORATE STUTTERING

[75] Inventors: Michael Pierre Rastatter; Joseph Stanley Kalinowski; Andrew Michael Stuart, all of Greenville, N.C.

[73] Assignee: East Carolina University, Greenville, N.C.

[21] Appl. No.: 08/831,043

[22] Filed: Apr. 1, 1997

Related U.S. Application Data

[60] Provisional application No. 60/022,839, Jul. 31, 1996.

[51] Int. Cl.⁶ A61F 5/58

[52] U.S. Cl. 600/23; 600/24

[58] Field of Search 128/846, 864-868;
600/23, 24, 27, 28



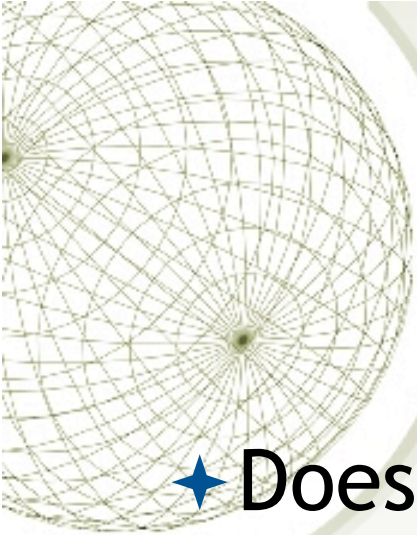
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Self-Contained In-the-Ear Device to Deliver Altered Auditory Feedback: Applications for Stuttering

ANDREW STUART,¹ SHIXIONG XIA,² YINING JIANG,² TAO JIANG,^{2,3} JOSEPH KALINOWSKI,¹
and MICHAEL P. RASTATTER¹

¹East Carolina University, Greenville, NC; ²Micro-DSP Technology Company, Ltd., Chengdu, Sichuan, People's Republic of China; and ³Dalhousie University, Halifax, Nova Scotia, Canada

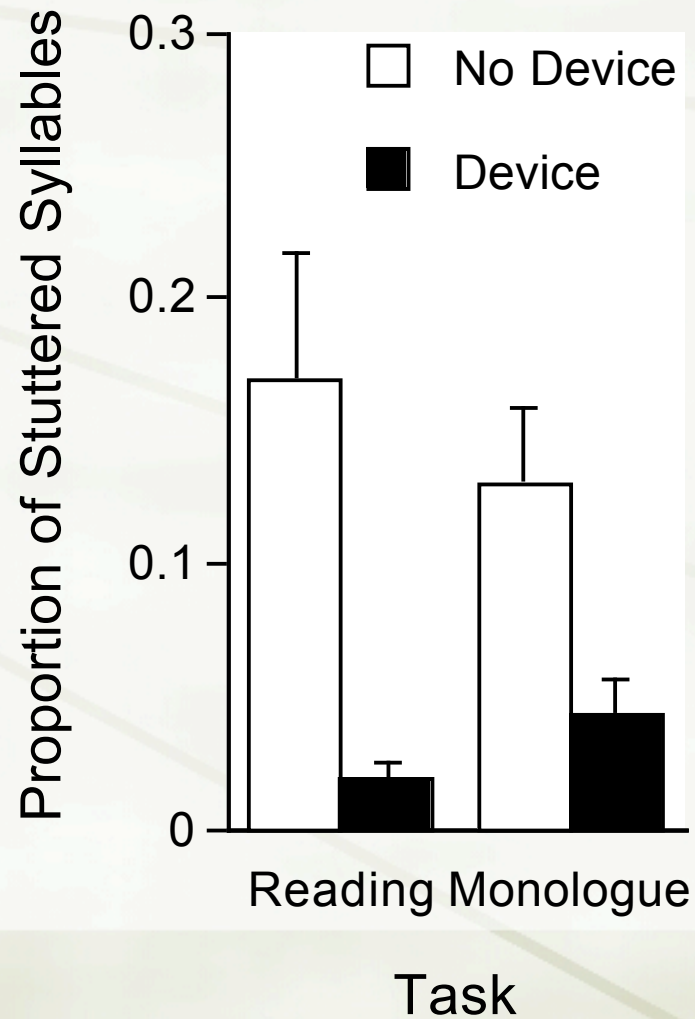


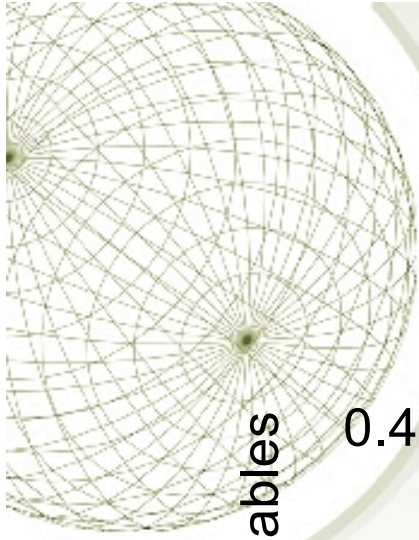
Preliminary Research Questions

- ★ Does an in-the-ear device work?
 - ★ With reading and monologue while over an extended length of time.
- ★ Does the speech of the user sound natural?
- ★ Is the user satisfied?

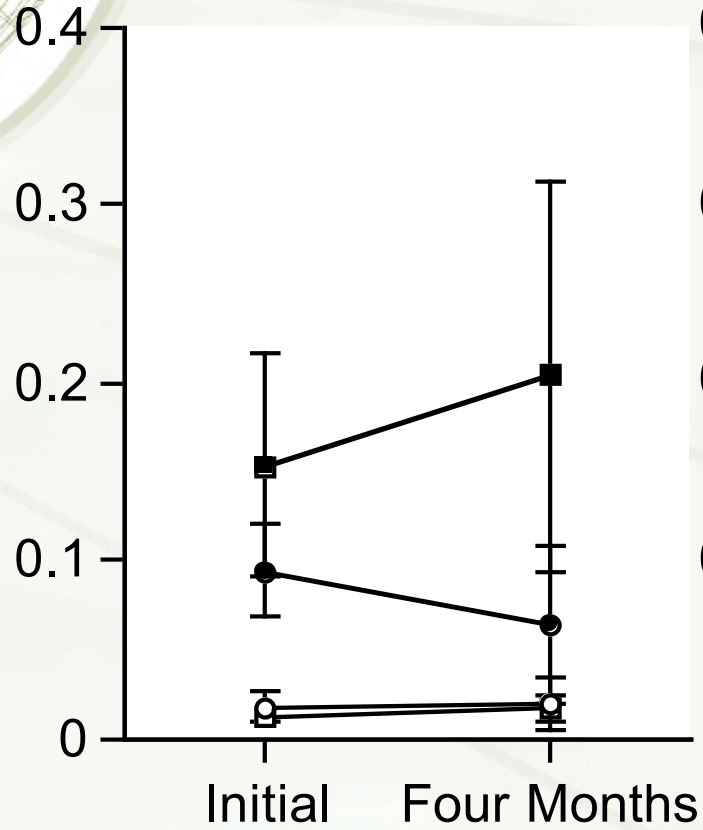
Initial Fitting and Follow-up

(Stuart et al., 2004)

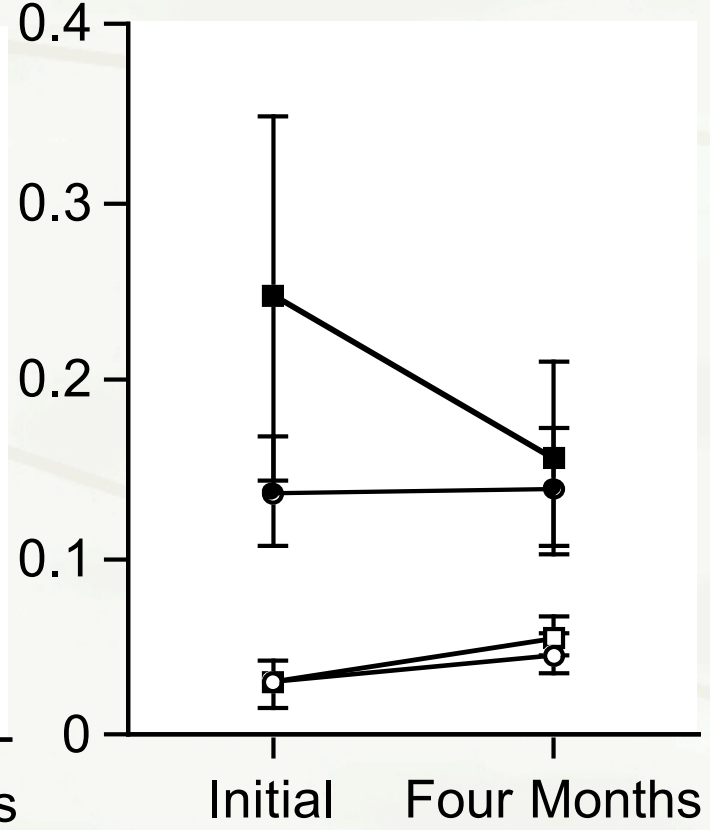




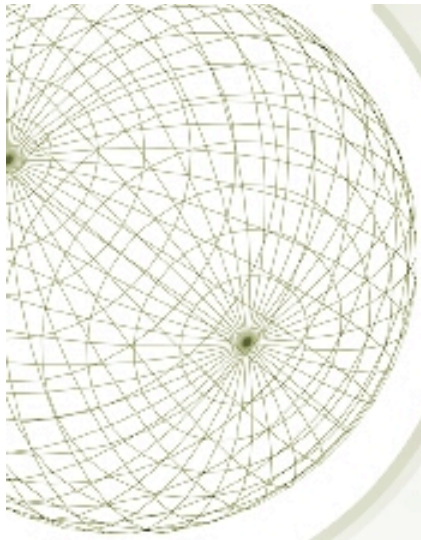
Proportion of Stuttered Syllables



Reading

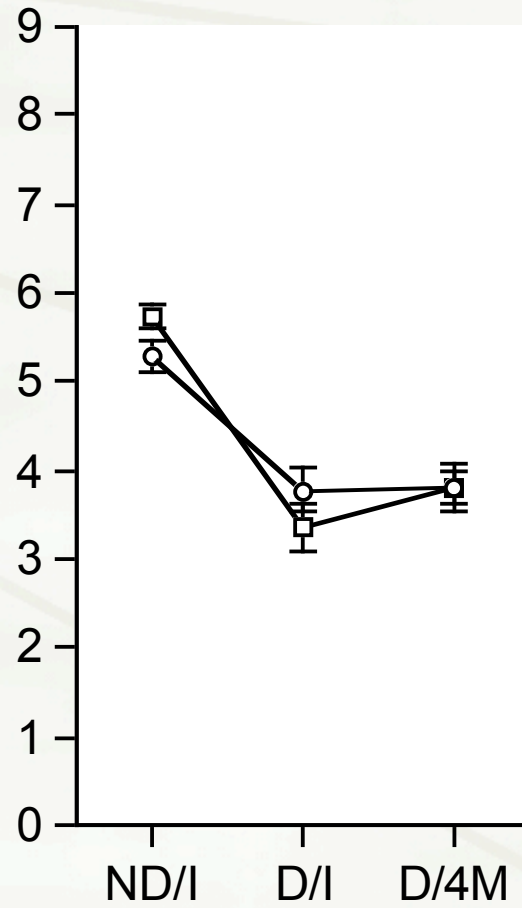


Monologue

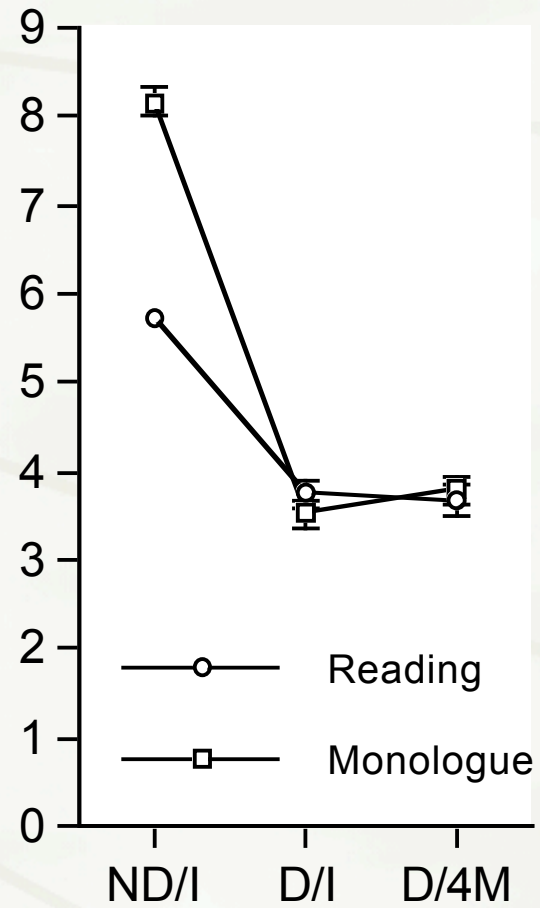


Naturalness Rating

Youth



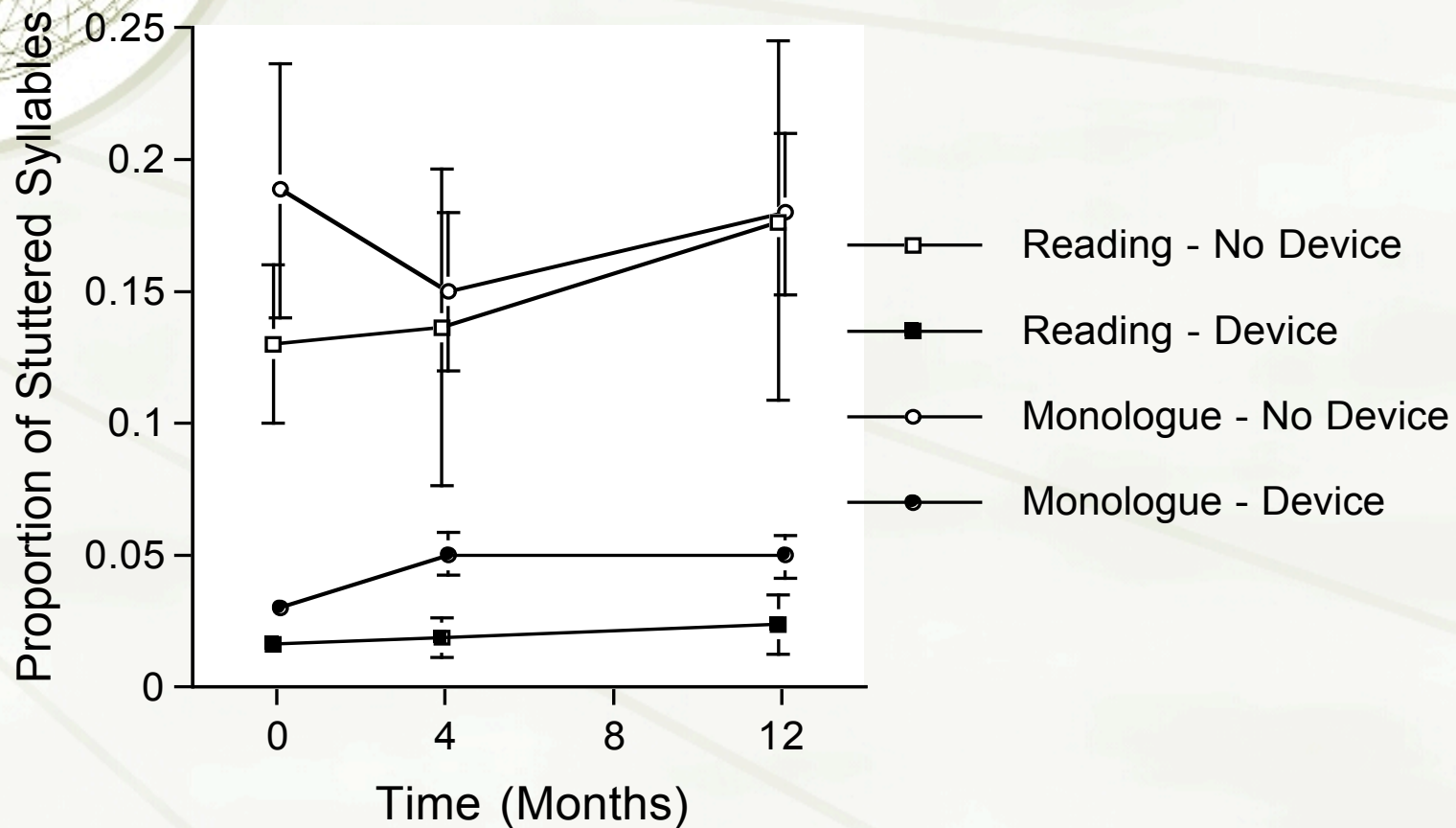
Adult

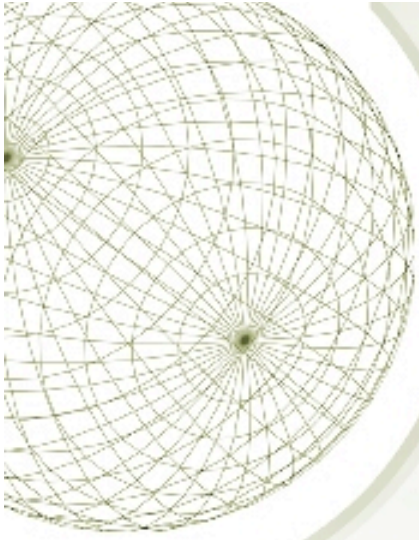


Speaking Condition

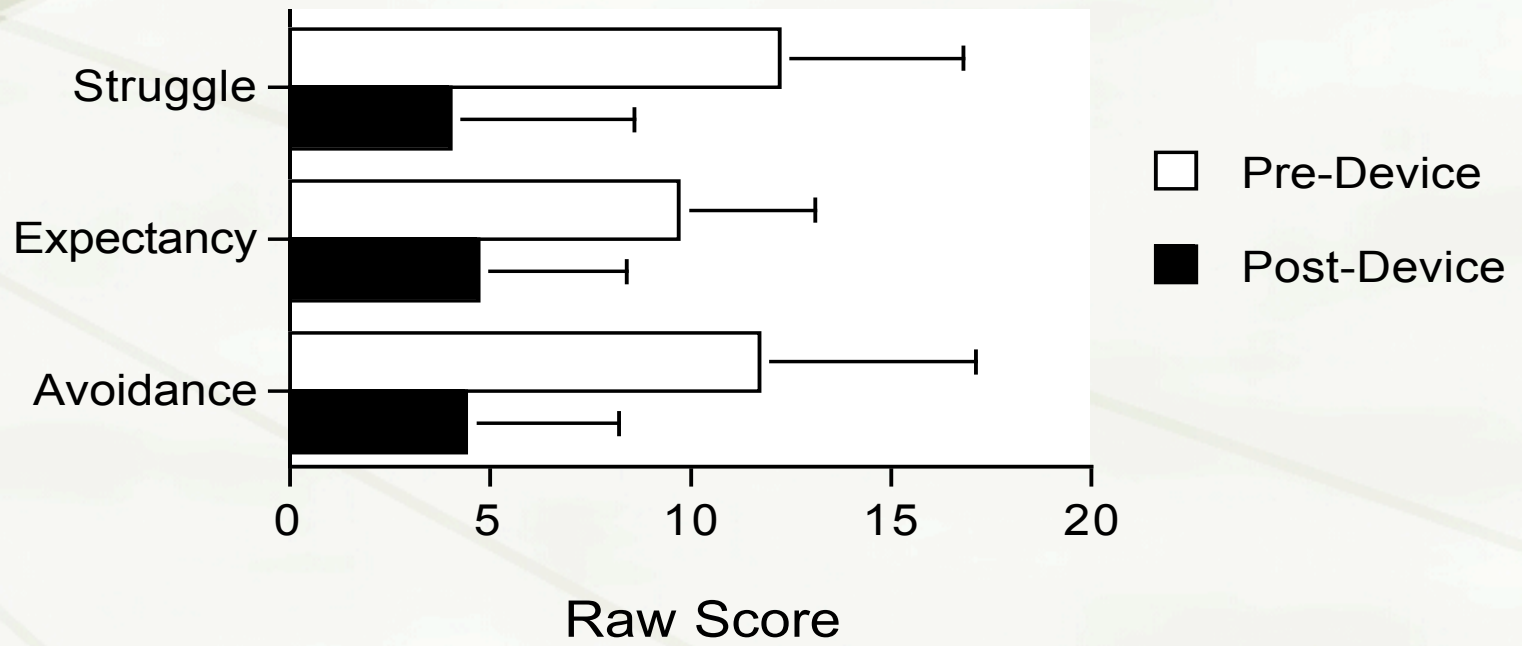
12 Month Follow-up

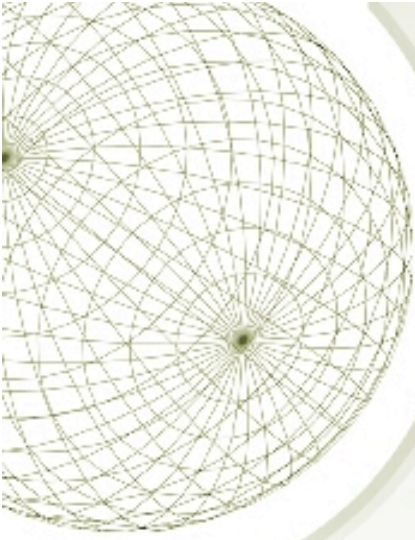
(Stuart et al., 2006)



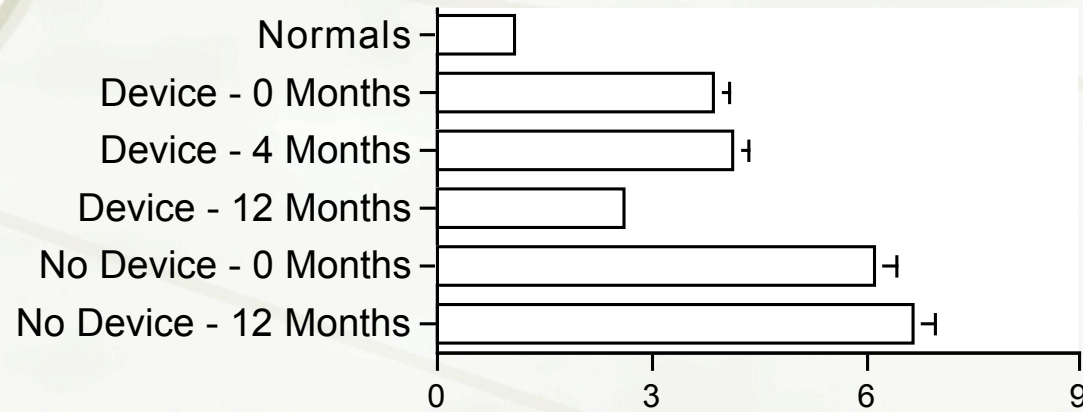


PSI Subscale

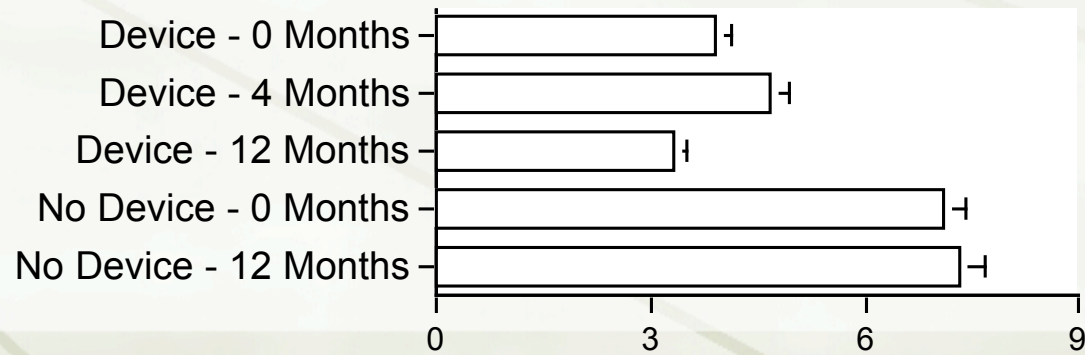




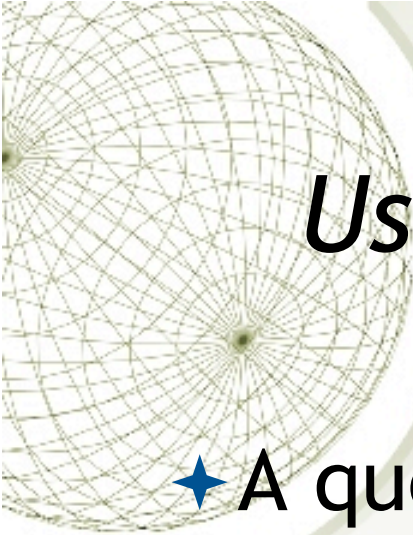
Reading



Monologue



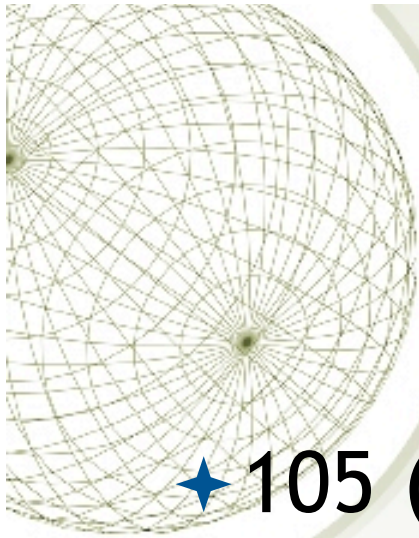
Naturalness Rating



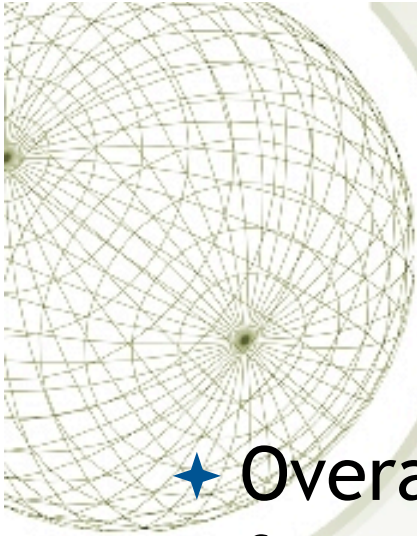
Users' Self Report Perspective

(Kalinowski et al., 2004)

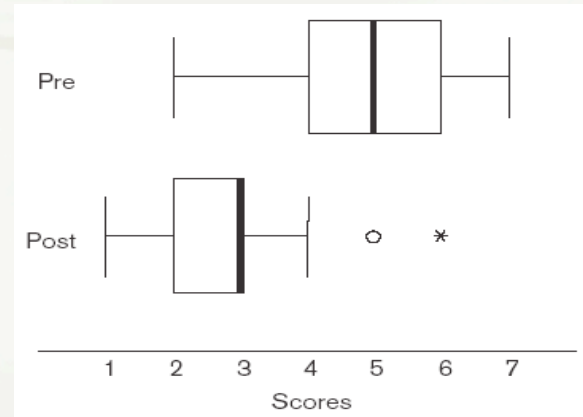
- ★ A questionnaire was mailed to 250 individuals who purchased the fluency device from three different distribution centers in the US.



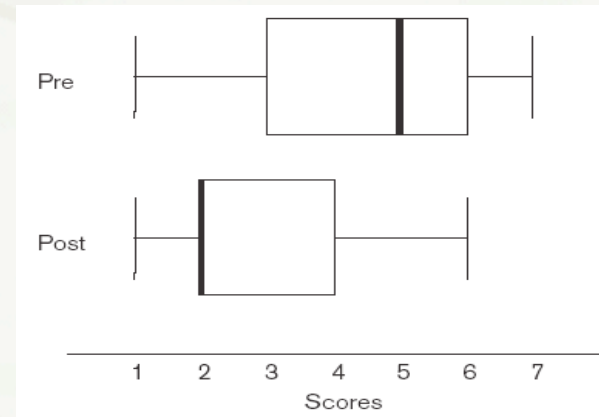
- ★ 105 (42%) usable questionnaires from 85 males and 20 females were returned from participants aged 7 - 81 ($M = 32$ years).
- ★ 7-point scales assessed 6 indices on perceptions before and after acquiring the device.

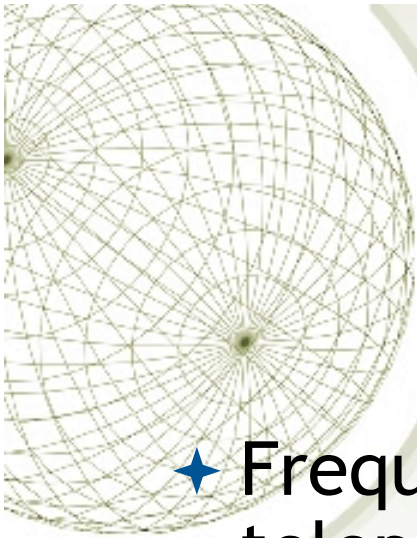


★ Overall stuttering frequency.

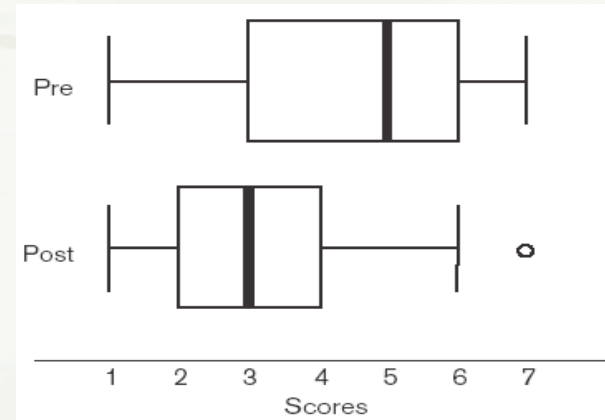


★ Use of speech and situational avoidances.

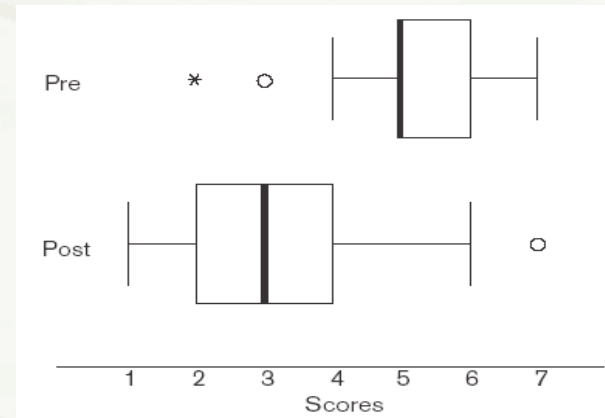


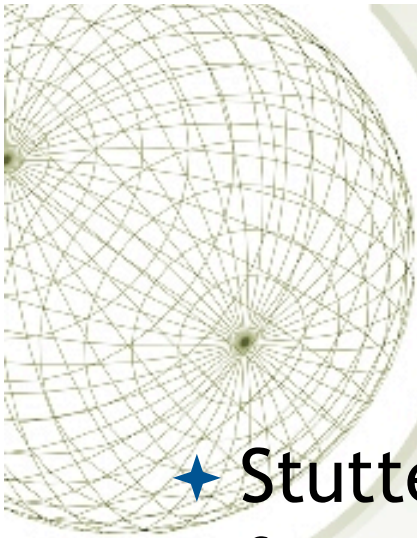


★ Frequency of telephone use.

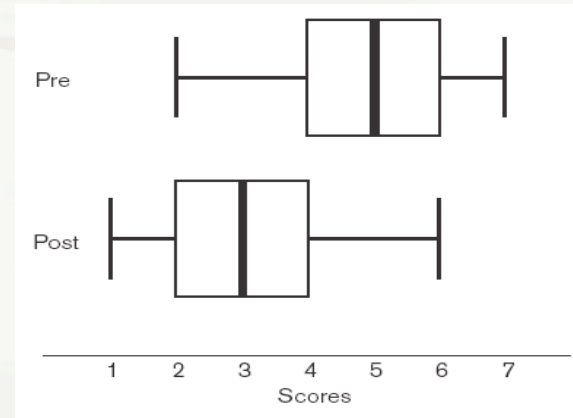


★ Frequency of stuttering while using the telephone.

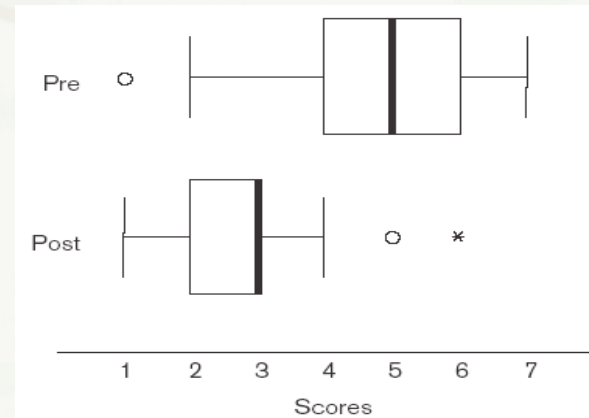




★ Stuttering frequency in face-to-face conversation.



★ Speech naturalness.





Where Now?

- ★ The therapeutic effect and its magnitude have been identified.
 - ◆ Phase 1 (Robey, 2006)
- ★ Explored the dimensions of the therapeutic effect in preparations for conducting a clinical trial.
 - ◆ Phase 2 (Robey, 2006)
 - ◆ Armson et al., 2006; Stuart et al., 2004, 2006



Issues

(Ingham et al., 1998; Kalinowski, et al., 1998; Lincoln et al., 2006; Onslow, 2001)

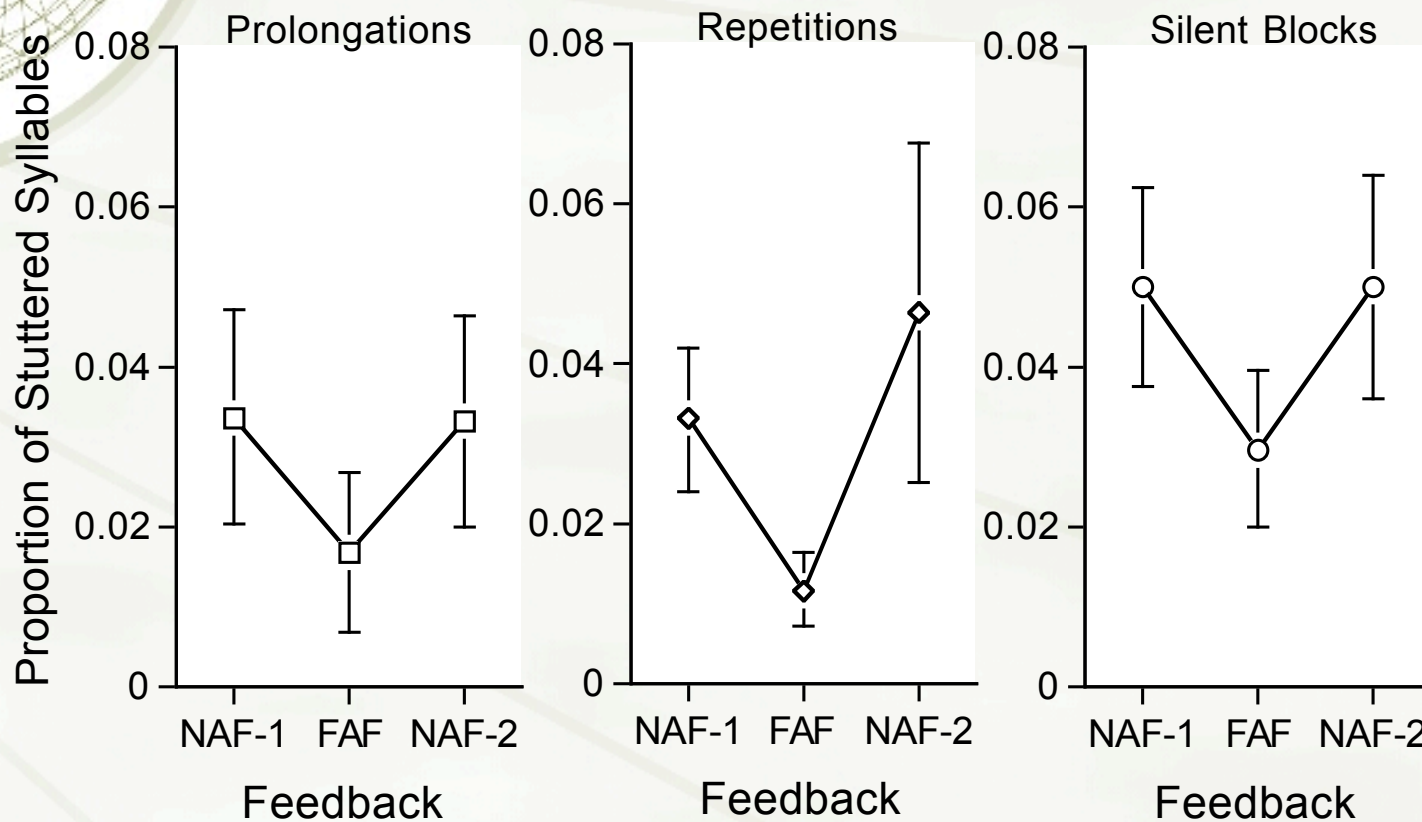
- ★ Conversational speech?
- ★ Variability of responsiveness to AAF?
- ★ Children?
- ★ Combination with other therapy?



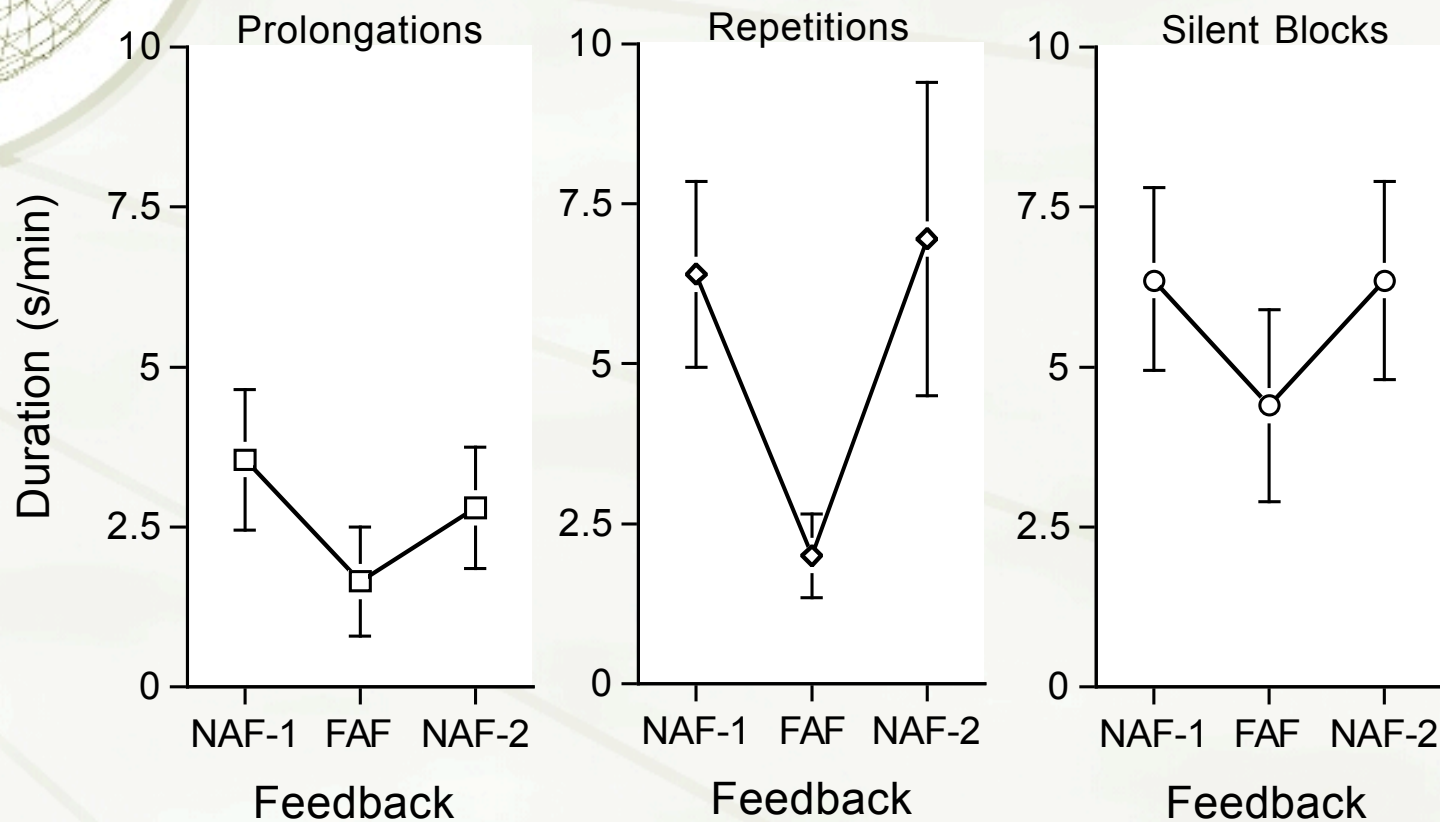
On the Issue of Variability

- ★ Are those individuals who stutter that do not respond to AAF “silent blockers?”
- ★ Is the duration of residual stuttering episodes reduced during AAF?
 - ★ That may explain why self reported measures of efficacy of AAF devices is positive.

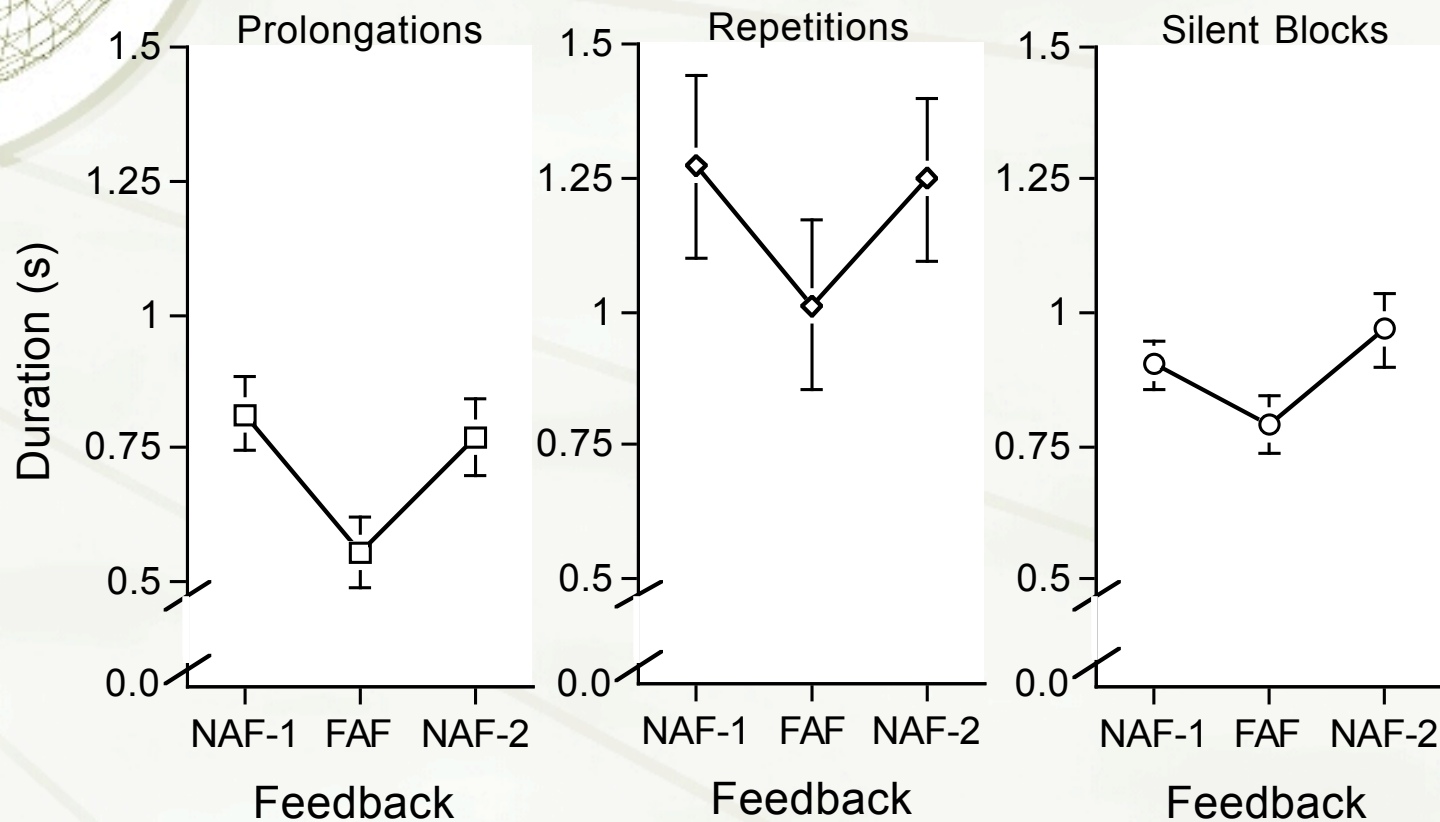
Proportion of Stuttered Syllables

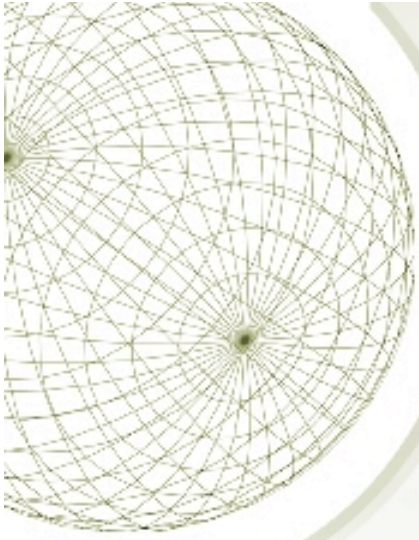


Total Duration of Stuttered Syllables



Average Duration of Stuttered Syllables





Questions