



LSVT for DBS-STN

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Effects of DBS-STN on Voice or Speech

The great majority of studies have reported adverse, sometime severe, effects of DBS-STN on voice and speech in individuals with IPD

(e.g., Klostermann et al., 2008; Tornqvist et al., 2005; Tripoliti et al., 2008).



Effects of LSVT on voice/speech

- Research has demonstrated that LSVT/LOUD can effectively improve voice and speech in dysarthric patients with DBS-STN (e.g., Mahler et al., 2008), however in **some** of these patients, **persistent difficulties** with articulation remain.
- **Purpose of present study:** To assess whether additional treatment (8 sessions) beyond LSVT can improve speech



The additional training

- **Loud+Clear.** A regimen designed to augment the LSVT effects by providing additional training in high effort oral speech articulation.
- **Note:** The word “Clear” clues the patient to over-enunciate speech sounds. The clinician demonstrates this mode of enunciation and has the patient exercise articulation with prescribed speech tasks.



Issue to consider

- **Can patients handle dual tasking (loud and enunciate).** Research suggests: In general, individuals with IPD have difficulties with dual tasking. However, with intensive training these individuals they can learn to handle dual tasks without compromising each of the tasks (Fox, Farley, Ramig, McFarland, 2006)



Hypotheses

Hypothesis I: The additional regimen will improve speech beyond the effects of the LSVT

Hypothesis II: The regimen will not compromise the effects of LVST on loud phonation



METHODS



Research Design

- Phase 1 of clinical trials study
- A multiple baseline single subject design
- 3 patients with IPD, post bilateral DBS-STN, receiving LSVT followed by a two week (8 sessions) regimen of additional training (“loud and clear”) to improve articulation.
- All patients were stable on their stimulator settings and medications prior to and throughout the study.



Patients' Characteristics

PATIENT	GENDER	AGE (years)	TIME SINCE DIAGNOSIS (years)	TIME SINCE SURGERY (months)	VOICE SEVERITY (0-5)	ARTIC SEVERITY (0-5)
DBS-6	M	59	6	8	2	3
DBS-7	M	67	10	13	3	4
DBS-9	M	54	8	17	1	1.5



Research Design (continued)

- Recording sessions
 - 3 pre LSVT
 - 2 post LSVT
 - 2 post additional training ("loud and clear")

- Recording
 - Acoustic data (dB SPL) were collected via an AKG 410 head-mounted mic in a sound treated booth.
 - Various voice and speech tasks. Here we report reading and conversation data.

Perceptual Ratings Tests of Voice and Speech

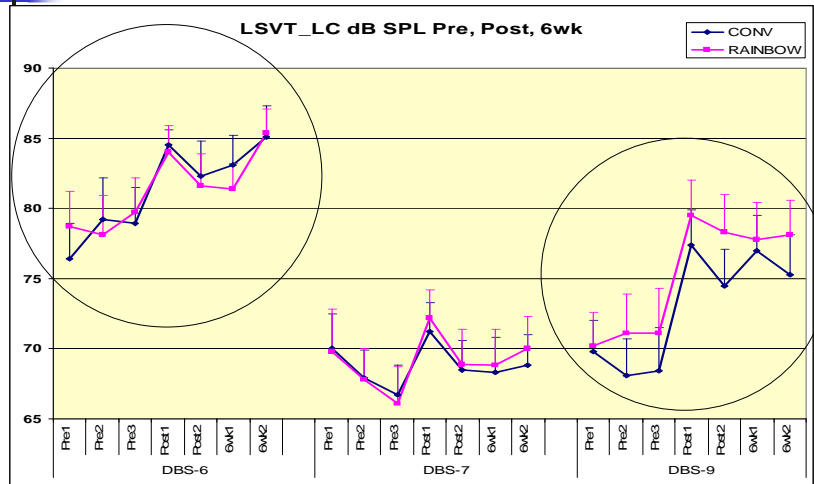


- Ss and their significant others (SO) completed perceptual forms before treatment and again at the post additional treatment sessions:
- **The modified self-administered Communicative Effectiveness Index (CETI-M)** (Ball et al., 2004; Dykstra et al., 2008).
- Visual Analogue scales to determine **perceived changes in loudness and articulation** (slurring and mumbling), as rated by SOs.



Results

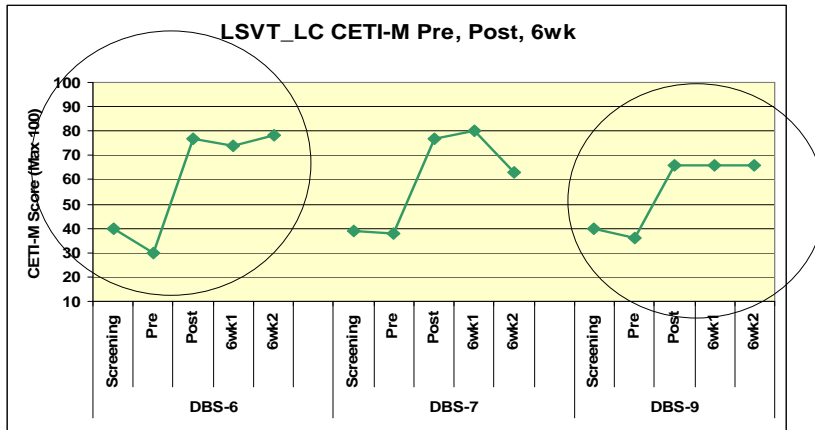
dB SPL for conversation and reading the Rainbow Passage



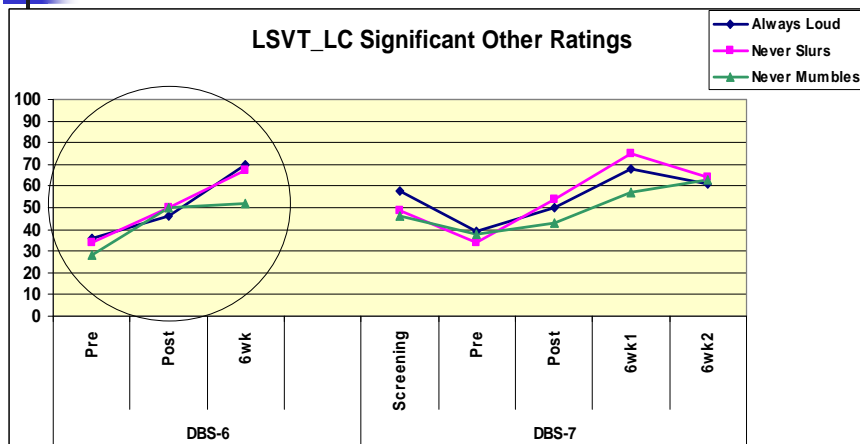
Interview: Patients' Responses Regarding Additional Treatment outcome

patient	Outcome better or same?	Speech clearer?	Easier to use voice strategies outside Tx?	Repeat less?	How would your speech be w/o the additional Tx
DBS-6	better	yes	yes	yes	Loud but not as clear
DBS-7	better	yes	IDK	I can't recall	IDK
DBS-9	better	yes	Once loudness was indoctrinated this allowed me to improve articulation of consonants	yes	Loud but less clear, mumbled

Self Ratings of Communication Effectiveness (CETI-M)

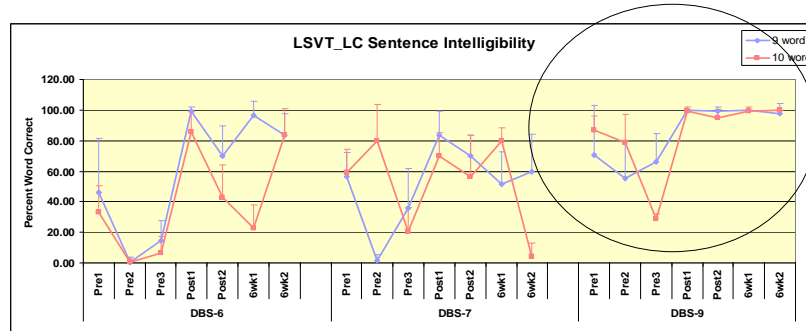


Significant Other Ratings (VAS) for percent “loud enough”, “never slurs” and “never mumbles”




Sentence Intelligibility:

Percent Word Correct for AIDS Sentences (14 listeners)



To Summarize thus far.....



Did the additional treatment have an impact on voice/speech?

yes, as reflected in **trends** of treatment outcome measurements in one or more of the Ss:

- dB SPL
 - Sig. Others' Ratings
 - Interview of patients re: artic. treatment outcome
 - Self rating of communication effectiveness
 - Sentence intelligibility (AIDS)
- **However**, there was **considerable variability** in treatment outcome measures across patients



Do the findings support the two hypotheses?

Yes, to some extent:


Hypothesis I: some aspects of speech improved beyond the LSVT effects

Hypothesis II: loud phonation was not compromised by the additional training; in fact, dB SPL improved somewhat in one of the Ss.



General Conclusions

- IPD individuals post DBS-STN are a heterogeneous group and differ from typical IPD in regards to speech treatment for a variety of reasons. As a result, it is most appropriate to consider them as individual subjects.
- It is difficult to conclude from these Phase 1 data that additional training beyond LSVT will certainly improve speech in individuals with DBS-STN. Nevertheless individual trends do suggest possible benefit for some subjects.
- We need to look at longer follow ups and more effective ways to improve articulation
- Future studies should investigate tools that more effectively measure “real world” changes than Ss and SOs describe.



LSVT and Clear Speech for DBS-STN

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case study: Loud and Clear

- Patient provided with LSVT-like intensive treatment, with emphasis on loud phonation, but with the addition of separating between words during structured and conversational speech. The instruction to separate the words is designed to prevent the tendency to mash words together and festinate (rush) speech articulation.
- Clear cues separate words to improve intelligibility

Pre- vs. Post LSVT & Clear (separate words) Therapy

M68, 3 yrs. Post DBS-STN



Loud & Clear (Separate words) Speech Therapy for DBS-STN

60 students raters (30 rated “pre” first, 30 rated “post” first)
Scale (Eq. Interval): +5= optimal, -5= severely impaired/abnormal
0=borderline normal

