Speech therapy and LSVT LOUD

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Disclosures

Drs. Ramig and Fox receive lecture honorarium and have ownership interest in LSVT Global, Inc.

STATEMENT ON DISCLOSURE AND CONFLICT: All members of this research team have fully disclosed any conflict of interest (Ramig and Fox) and their conflict of interest management plan has been approved by the Office of Conflict of Interest and Commitment at the University of Colorado, Boulder.

Presentation Objectives

1) ***Discuss the Five Phase of development of a speech treatment for PD***
2) ***Identify treatment-related insights***
3) ***Introduce new horizons in exercise/rehabilitation***
4) ***Highlight use of technology to enhance accessibility***

Nearly 90% of over 8 million individuals with PD worldwide have a speech problem

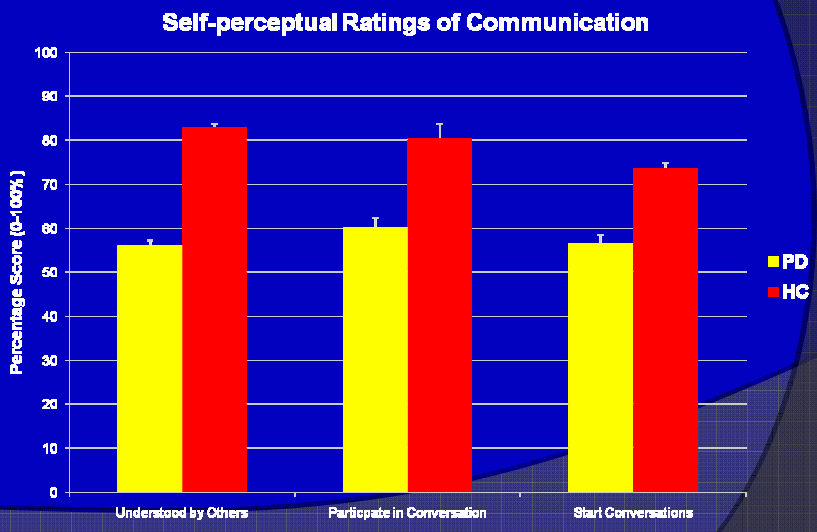
4% receive speech treatment

(e.g., Mutch et al, 1986; Hartelius & Sveenson, 1994)

"if I have no voice, I have no life"

-Natalie

PD less likely to participate in conversations or have confidence in voice
PD=30, HC=14 (Fox and Ramig, 1997)



Medical Treatment of Speech and PD

Pharmacological Tx:

"…no evidence of systematic improvement in dysarthria owing to dopamine replacement therapy." *(e.g., Pinto et al, 2004)*

Surgical Tx:

Neurosurgical interventions do not consistently or effectively improve speech in PD

(e.g., Freed et al., 1992; Goberman, 2005; Pinto et al., 2004; Rousseaux et al., 2000)

Dysarthria reported after DBS-STN ranges: 5% - 61%

(Krack et al, 2003; Rodriguez-Oroz et al, 2005; Gan et al, 2007; Guehl et al, 2006).

Speech treatment for PD

Despite years of efforts, speech treatment for PD historically has been "ineffective" *(e.g., Sarno, 1968; Allen, 1970; Cochrane review, 2001)*

"changes in the speech treatment room disappear on the way to the parking lot"

Video Example:

59 year old female
2.5 years post-diagnosis
On-meds pre and post video

Pre/post LSVT
(Lee Silverman Voice Treatment)
Intensive physical exercise of speech mechanism

20+ year journey from invention to scale-up

Robey and Schulz, 1998

Phase I, II

1987-89: Initial invention; Pilot data (Scottsdale)

1989-91: Office of Education OE-NIDRR

Phase III

1991-94: OE-NIDRR
1990-95: NIH R01 funded RCT Efficacy
1995-00: NIH R01 funded EMG, Kinematics
2002-07: NIH R01 funded RCT Spread of effects
2007-11: NIH R01 funded RCT, imaging

Phase IV, V

2001-02: Coleman Institute (PDA; LSVTC)
2002-04: NIH R21/Michal J Fox Foundation PDA
2002-04: Coleman Institute (LSVTVT)
2004-06: NIH R21 LSVTVT
2006: NIH SBIR Technology-enhanced Clinician Training
2008: Parkinson Alliance; Phinney Foundation STN-DBS
2009: Davis Phinney Clinician training on line
2009: NIH SBIR LSVTC online

PHASE 1: Invention "the Need" 1987

"If only we can hear and understand her"

Family of Mrs. Lee Silverman

PHASE III EFFICACY: IN LAB

Completed TWO randomized control trials (RCT) to test efficacy (THIRD RCT in process)

Respiratory vs. Respiratory and voice (LSVT)

- *Pre to post (Ramig et al., 1995)*
- *Pre to 12 months follow-up (Ramig et al., 1996)*
- *Pre to 24 months follow-up (Ramig et al., 2001)*

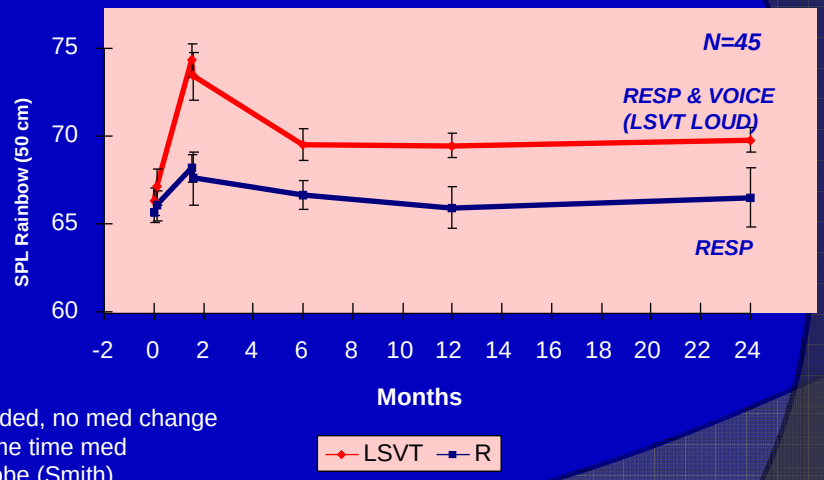
Respiratory and voice (LSVT) vs. Control groups

- *Pre to Post to 6 months follow-up (Ramig et al., 2001)*

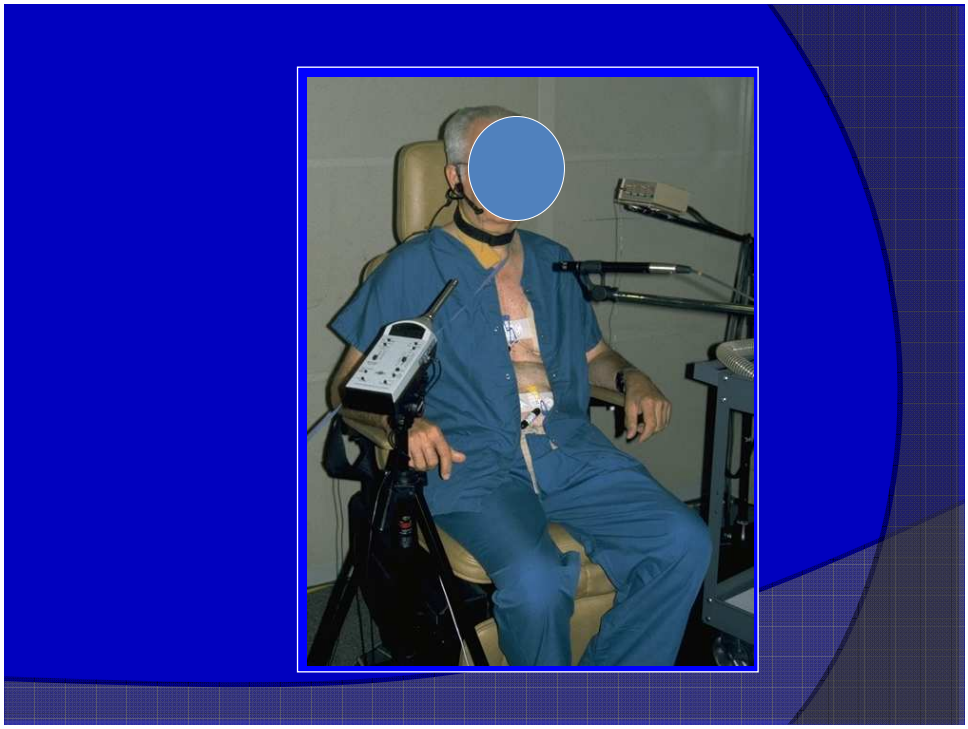
SUBJECT CHARACTERISTICS

		Age	TSD	Stage (Hoehn & Yahr)
Denver	**LSVT** (n = 26)	63.5 (11.5)	8.3 (9.3)	2.7 (0.7)
	RESP (n = 19)	65.6 (8.9)	5.9 (4.7)	2.3 (0.8)
Tucson	**LSVT** (n = 14)	67.9 (8.9)	8.5 (6.3)	3.1 (1.2)
	Untreated (n = 15)	71.2 (11.75)	6.7 (5.0)	2.4 (0.6)
	Age-Matched Control (n = 14)	69.8 (7.53)	---	---

Ramig et al., 2001; JNNP
Level 1 Evidence Goetz,2003



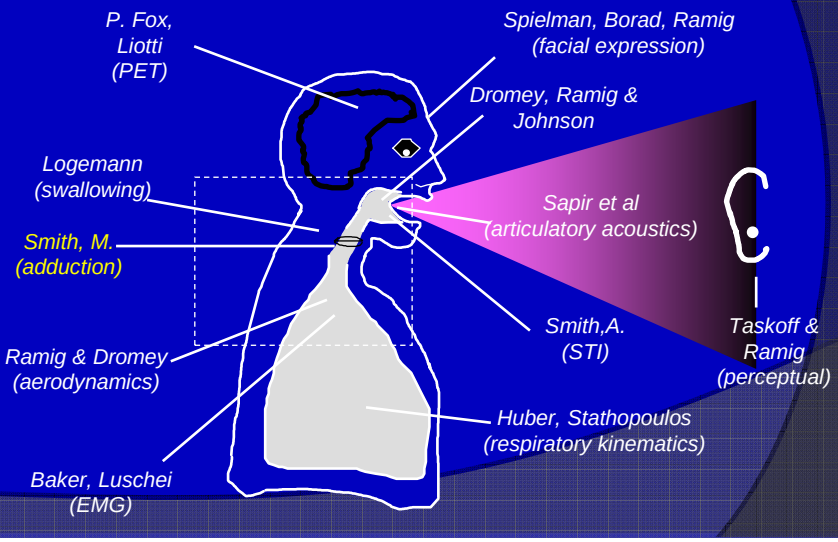
Blinded, no med change
Same time med
Strobe (Smith)
EMG



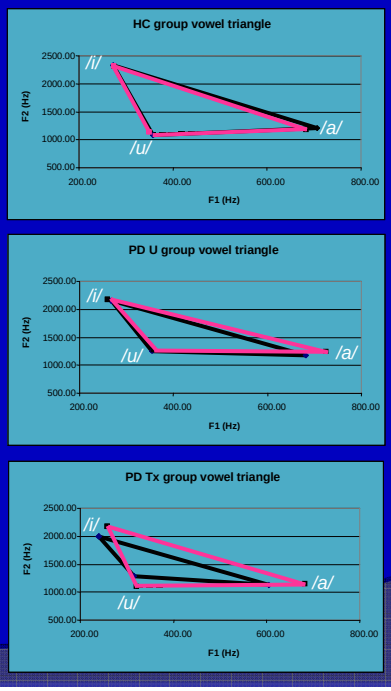
Cross System Effects

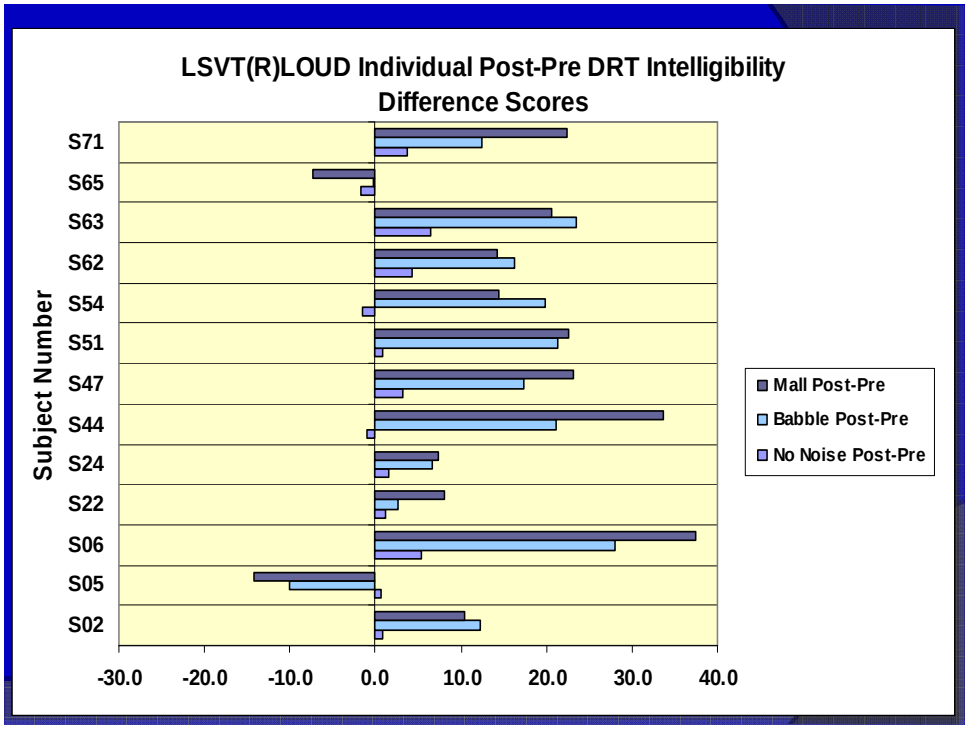
Established Clinical Efficacy *(Level I evidence)*

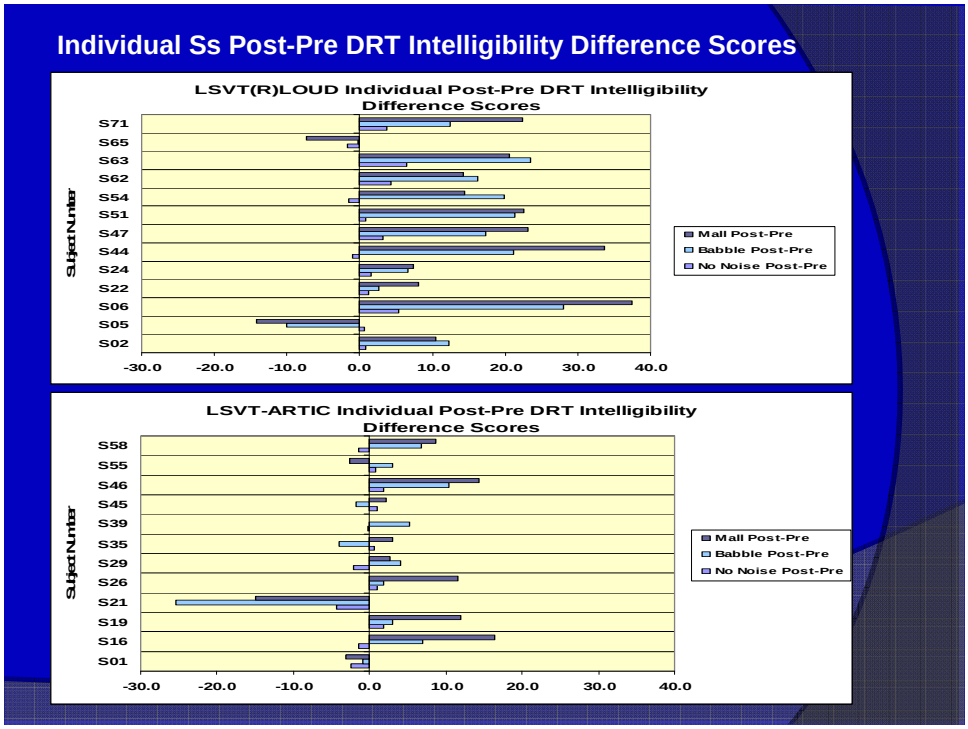
(Ramig et al, 1995; 1996; 2001a; 2001b; Goetz, 2003)



Sapir et al, 2007
JSHLR




LSVT(R)LOUD Individual Post-Pre DRT Intelligibility Difference Scores
Subject Number
S71
S65
S63
S62
S54
S51
S47
S44
S24
S22
S06
S05
S02
-30.0
-20.0
-10.0
0.0
10.0
20.0
30.0
40.0
Mall Post-Pre
Babble Post-Pre
No Noise Post-Pre


Individual Ss Post-Pre DRT Intelligibility Difference Scores
LSVT(R)LOUD Individual Post-Pre DRT Intelligibility Difference Scores
S71
S65
S63
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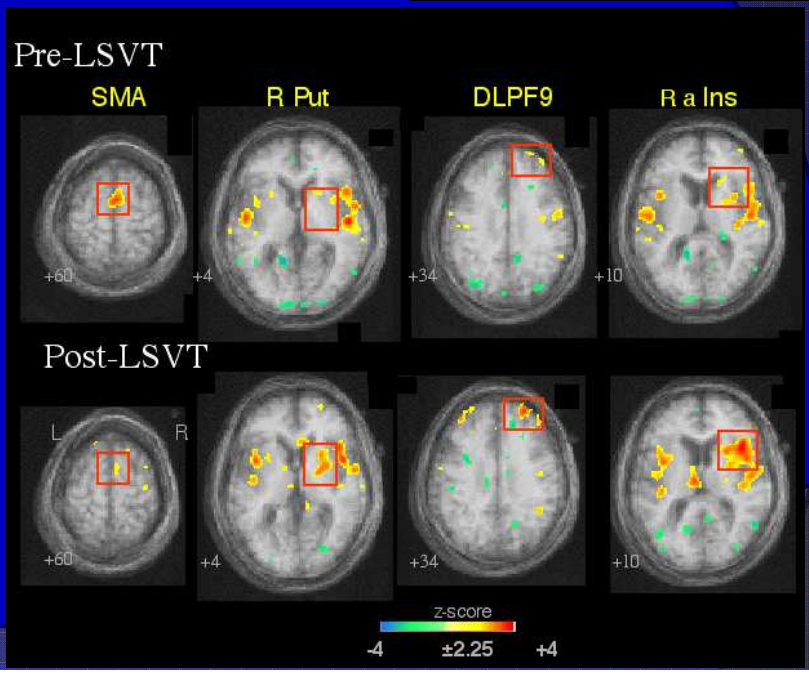
S24
S22
S06
S05
S02
-30.0
-20.0
-10.0
0.0
10.0
20.0
30.0
40.0
Mall Post-Pre
Babble Post-Pre
No Noise Post-Pre
LSVT-ARTIC Individual Post-Pre DRT Intelligibility Difference Scores
S58
S55
S46
S45
S39
S35
S29
S26
S21
S19
S16
S01
-30.0
-20.0
-10.0
0.0
10.0
20.0
30.0
40.0
Mall Post-Pre
Babble Post-Pre
No Noise Post-Pre

Liotti et al, 2003 Neurology



PHASE IV EFFCTIVENESS: IN CLINIC

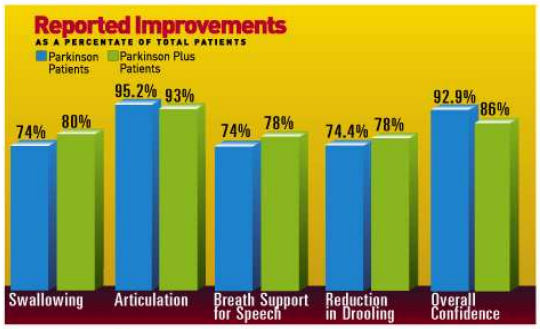
"degree to which the therapeutic effect is realized in day to day real-world clinical practice"

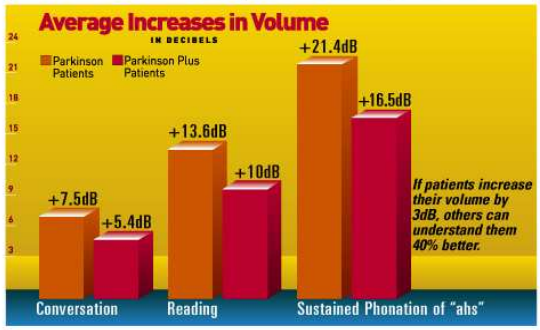
TEXAS VOICE PROJECT FOR PARKINSON DISEASE

A project under the auspices of the NATIONAL PARKINSON FOUNDATION

100 patients

Real World Effectiveness Data





*What are the fundamentals of **LSVT LOUD**?*

Standardized, research-based specific protocol
Clinicians specifically trained; Global Treatment Fidelity

***TARGET**: Vocal loudness (amplitude)*

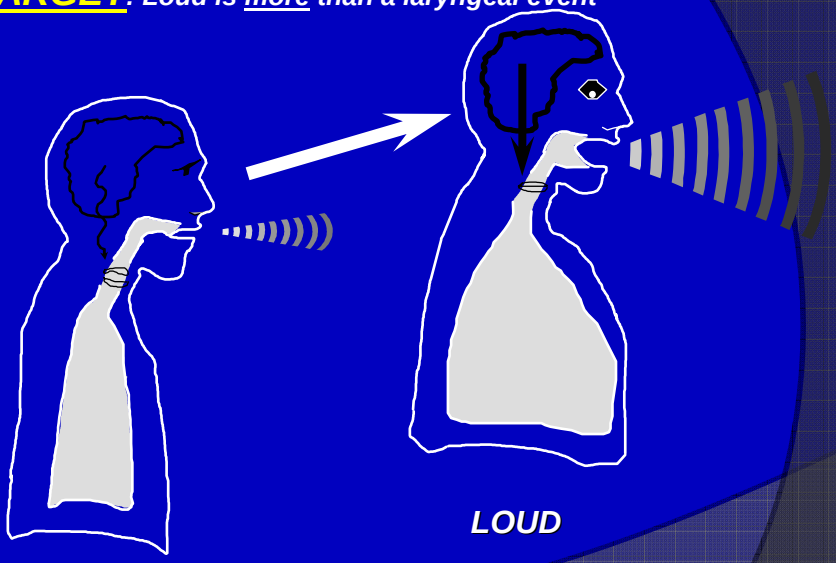
***MODE**: Intensive and High Effort*

***CALIBRATION**: Generalization*

- *Sensory mismatch (Ho et al., 1999)*
- *Internal cueing (Morris et al., 2000)*
- *Neuropsychological changes*

(Ramig, et al, 1995; Fox et al, 2002; Sapir et al, 2008)

TARGET: Loud is more than a laryngeal event



SOFT

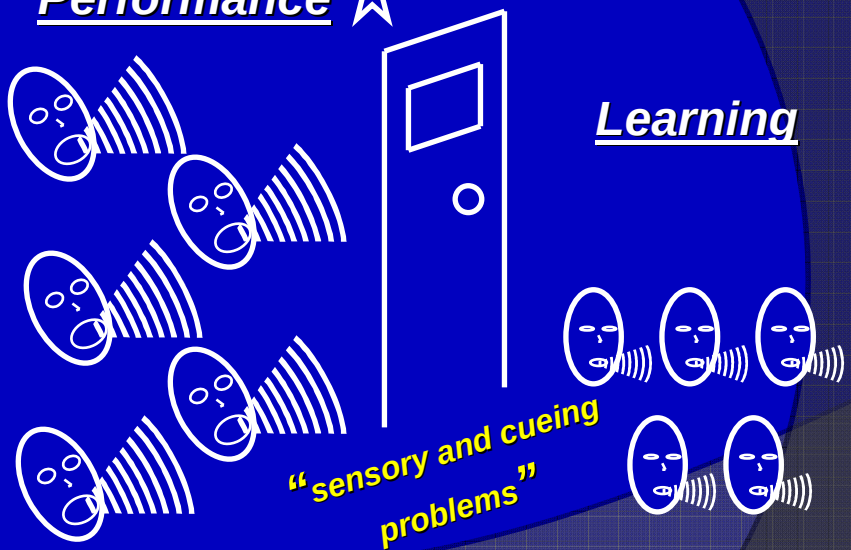
LOUD

***HEALTHY LOUDNESS

simple to patient, clinician not

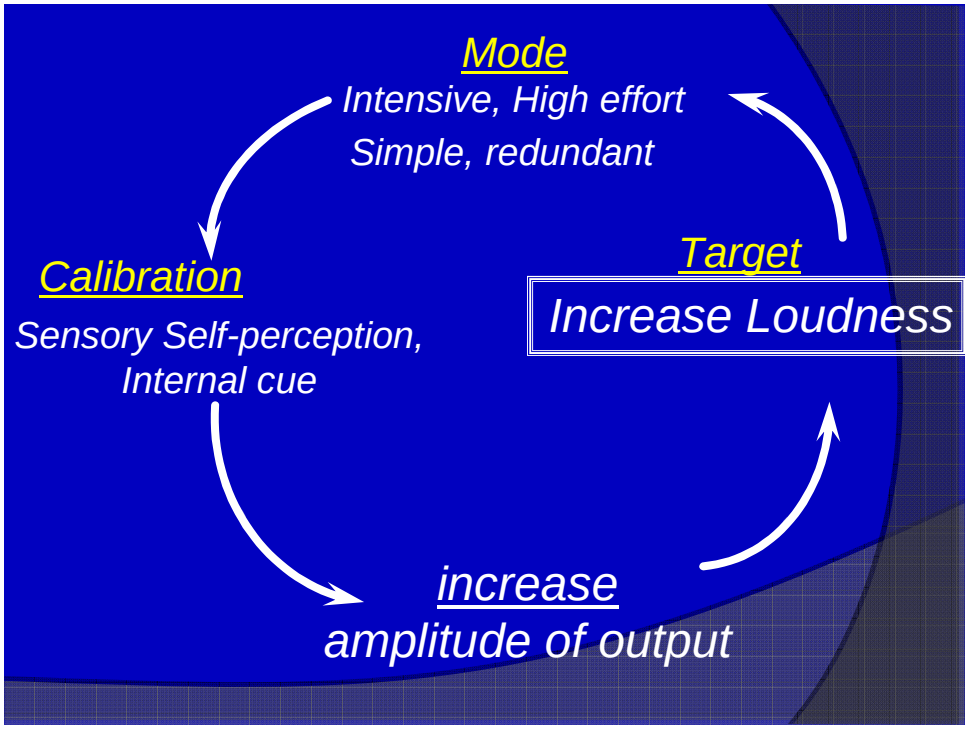
Neural coupling (McClean and Tasko)

Performance ☆



Learning

"sensory and cueing problems"


Mode
Intensive, High effort
Simple, redundant
Target
Increase Loudness
Calibration
Sensory Self-perception,
Internal cue
increase
amplitude of output

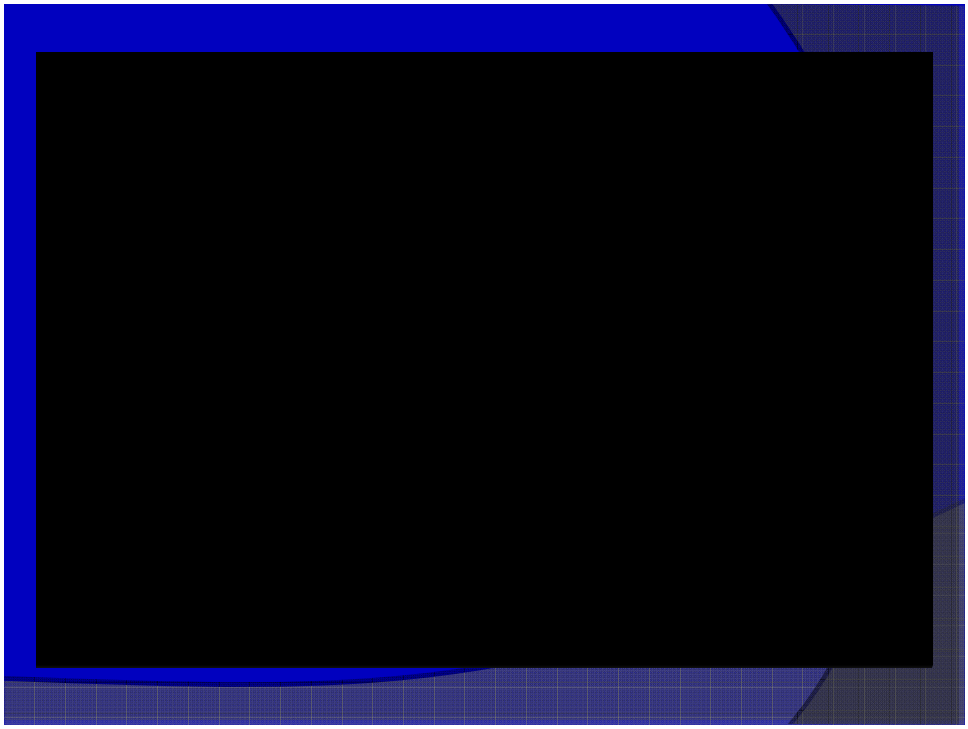
Summary Treatments for Speech in PD

Treatment	*Impact*
Pharmacological	--
Surgical	-↓ (Queen Square*)
Pharmacological + Speech Tx	↑↑***
Surgical + Speech Tx	↑-
Speech Tx Alone	??

Principles of LSVT may generalize

To other motor systems
e.g., limb motor system

(Farley & Koshland , 2005; Farley et al., in press; Farley & Koshland, in preparation) Phase 1, 2



Comparing Exercise in Parkinson's Disease — The Berlin BIG Study (in press, Movement Disorders)

Georg Ebersbach,* *Almut Ebersbach, Daniela Edler, Olaf Kaufhold, Matthias Kusch,* Andreas Kupsch, and Jo¨rg Wissel[3]

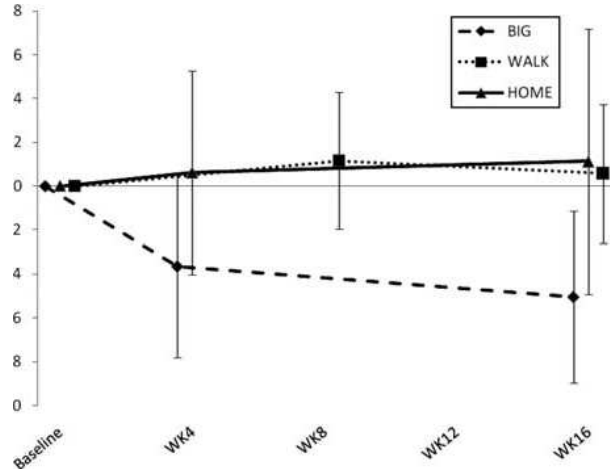


FIG. 2. UPDRS motor score (blinded rating), mean change from baseline (vertical bars 5 standard deviations). Change between baseline and follow up at week 16 was superior in BIG (interrupted line) compared to WALK (dotted line) and HOME (solid line), P <0.001. ANCOVA did not disclose significant differences between in intermediate and final assessments.

*S**imultaneously** treat the speech and limb motor systems.*

LSVT HYBRID = LOUD + BIG

May promote greater plasticity through greater intensity, complexity, saliency

Enhance practical, logistical, financial costs of PD rehabilitation

Physiological substrates for movement are present in PD - AMPLITUDE may allow scaling, access or triggering of these substrates

Training BIG and LOUD
Day 2
52 year old female
6 mos post diagnosis
denovo

LSVT HYBRID retrains

"normal use"

"In my normal everyday life,
I just exaggerate my movements.
I keep things Big when
I reach for things,
or when I bend or when I walk;
and when I talk –
I keep my voice strong."

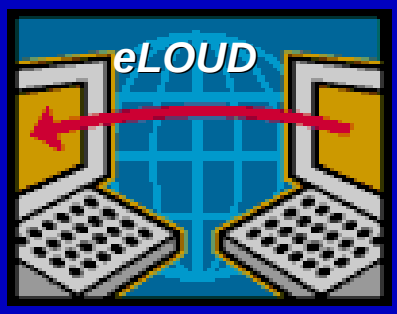
PHASE V - SCALE ACCESS

Will treatment make an impact on real world scope of practice?

Who benefits and at what cost?

Today LSVT delivered in over 40 countries

Need to assess different means for delivering treatment protocol (use of technology)



Telehealth (Theodoros et al, 2004)

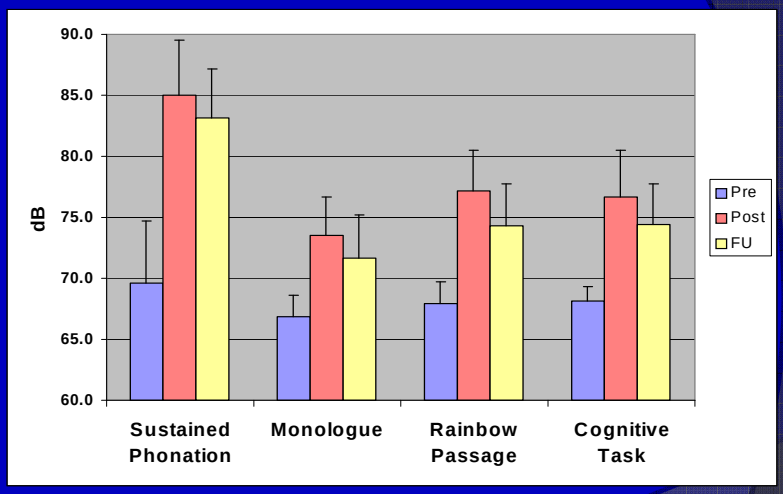
LSVTC (Halpern et al, 2003)

LSVT-C

NIH-NIDCD

Michael J. Fox Foundation

Pre, Post, 6 month dB SPL *(p< 0.001)*



Changes consistent with those reported in previously published data *Halpern et al, in prep*

Summary Presentation Objectives

1) ***Discuss the Five Phase of development of a speech treatment for PD***

2) ***Identify treatment-related insights***

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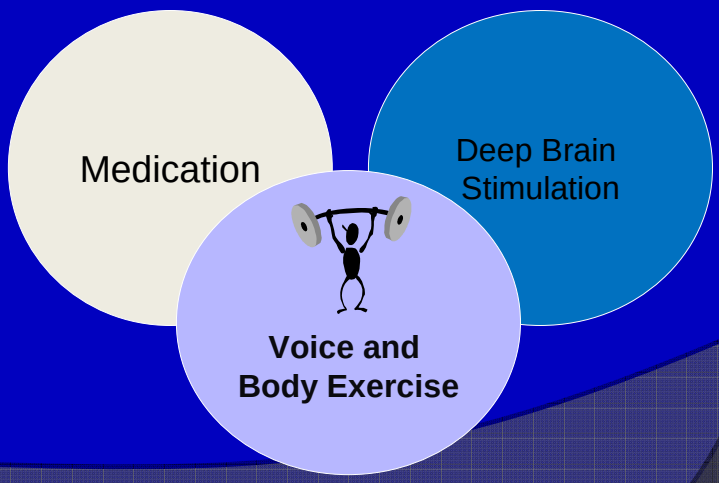
4) ***Highlight use of technology to enhance accessibility***

Legitimate Therapeutic Options

To provide symptomatic relief; improve function



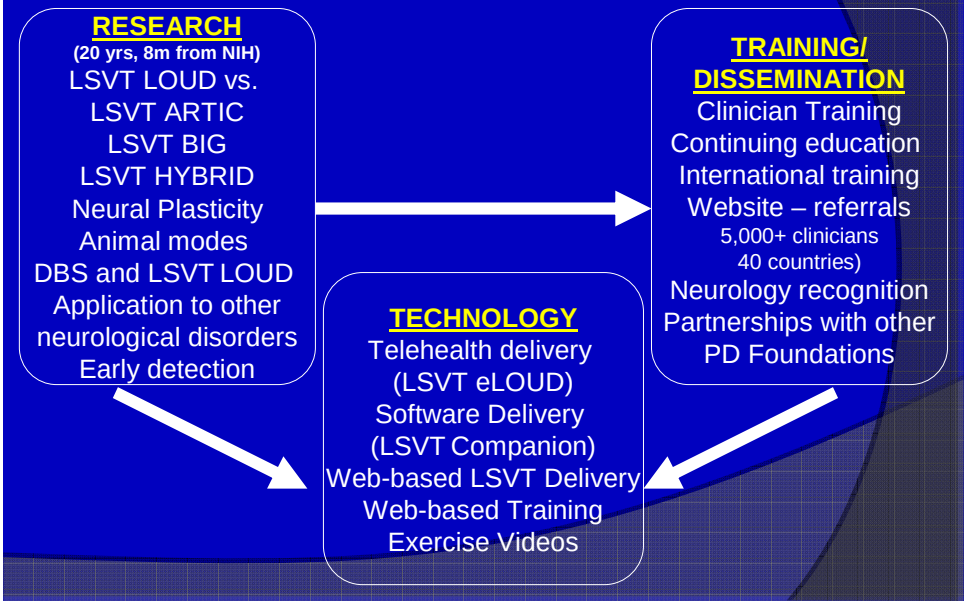
Shimon Sapir and Heather Gustafson

THE END

It is a "Stunning Time" to be in rehabilitation today

- ***Basic science has caught up with our clinical outcomes***
- ***Exercise is medicine!***

Global Access to Effective Rehabilitation in PD



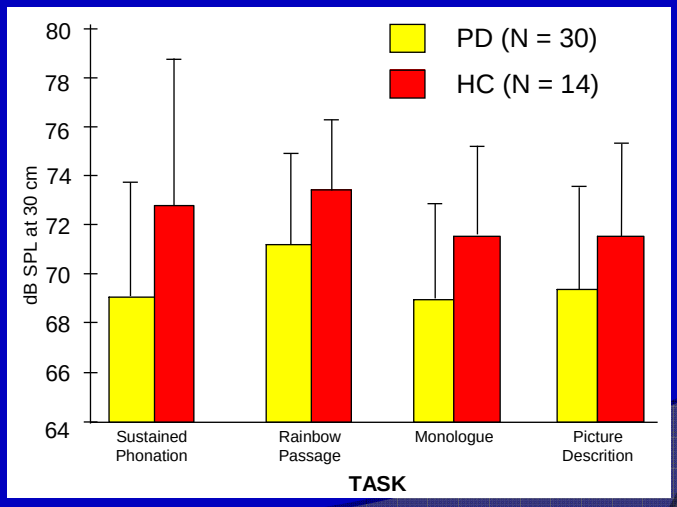
Impact of Neuroscience on Rehabilitation

- *Basic science evidence for the value of exercise in PD (classically drugs, surgery, today…)*
- *Identified key principles of exercise that drive activity-dependent neural plasticity*
- *Demonstrated that exercise can improve brain functioning (neural plasticity) and may slow disease progression*

***JSHLR Kliem & Jones, 2008; Ludlow et al, 2008*

Primary outcome variable: Vocal Loudness

Acoustic Vocal SPL (reduced vocal loudness)
2-4 dB SLP (Fox & Ramig, 1997)



Pharmaceutical industry

***On average*: It takes 12 years, 802 MILLION DOLLARS and only 5 in 5000 compounds tested make it from pre-clinical testing to people**

Pre-clinical trials animals (3.5 years)
Phase I Safety and dosages (1year)
Phase II 100-300 Ss safety & efficacy, side effects (2yrs)
Phase III 1,000-3,000 monitor adverse reactions from long-term use (3 years)
FDA approval (2.5 years)
Phase IV Post market testing

(Di Masi, Hansen, Grabowski 2003)

TARGET

Voice

as a

Source: *Carrier in signal transmission*

Trigger: *Enhance effort and coordination across motor speech system "global variable LOUD"*
(Schulman; Dromey, Ramig & Johnson, 1995)

MODE OF DELIVERY

Intensity across sessions:

Treatment delivered 4 consecutive days a week for 4 weeks
Individual, 60 minute sessions (16 hours)
Daily homework practice (all 30 days of the month)
Daily carryover exercises (all 30 days of the month)

Intensity within sessions:

High effort, repetitions, force/resistance,accuracy

What do data say?
Intensive practice is important for maximal plasticity
(Kliem & Jones, 2008)

CALIBRATION

SENORY MISMATCH between on-line perception of output and how others perceive it (e.g. Ho et al., 1999 ; 2000; Graber et al., 2002)
"I'm not too soft" My spouse needs a hearing aid"
"I can't speak like this, I am shouting!!"

INTERNAL CUEING (e.g., Morris t. al, 2000)

NEUROPSYHOLOGICAL (.g., Fox t al, 19)