An Overview of Neurological Stuttering
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Motor Speech Disorders
Com Dis 624
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Introduction to neurogenic stuttering

• Motor speech disorder
• Primary symptom = dysfluent speech
• Differential is difficult because
  - symptoms can overlap with other MSD
  - it can co-exist with other MSD
  - there are other forms of stuttering (i.e. psychogenic and developmental)
• AKA acquired stuttering and cortical stuttering
Etiologies

- **Acute**
  - TBI = 38%
  - Stroke = 37%
  - Drugs = 6%
  - Neurosurgery = 4%

- **Degenerative**
  - Parkinson’s disease
  - Dementia
  - Seizure disorders
  - Brain tumors

(Duffy 2005)
Site of lesion

• Studies have found left hemisphere lesion is most prevalent
  -38% among all neurogenic stuttering cases (Duffy 2005)
  -Survey done by Theys et al. found that out of 29 neurogenic stuttering patients, 17 had lesions in left hemisphere
• As a result of left hemispheric damage the right hemisphere becomes overactive for language (Neumann 2003)
More possible lesion sites

- Sub-cortical structures: basal ganglia
  - Breakdown in BG causes an inability to sequence new speech patterns and automatic speech tasks (Smits-Bandstra & DeNil 2007)
  - When acquired stuttering is associated with Parkinson’s the lesion site is in the BG (Smits-Bandstra & DeNil 2007)
  - Contrary to Duffy, sub-cortical neuronal breakdown is directly related to neurogenic stuttering (Giraud et al. 2007)
Sub-cortical structures: thalamus

- Pathways between cortex and thalamus = primary lesion site (Kent 2000)
- Characteristics of stuttering due to thalamus involvement versus “typical” characteristics of neurogenic stuttering suggests distinct clinical entity (Van Borsel 2003)
Common characteristics

• Neurogenic
  - lack of secondary behaviors
  - lack of anxiety
  - lower amount of blocks
  - difficulty producing function and content words
  - difficulty with syllables in all word positions

• Developmental
  - secondary behaviors
  - anxiety
  - higher amount of blocks
  - difficult with content words
  - difficulty with word initial syllables

(Van Borsel 2001 & Theys 2008)
Treatment

- Treat individual according to constellation of symptoms
- Most common techniques applied:
  - slowed and smooth rate of speech movements
  - soft voice onsets
  - continuous phonation
  - light articulatory contacts
  - voice control such as appropriate tone, loudness, resonance
  - appropriate breath support
  - relaxation techniques
Prolonged Speech Patterns

• Patterns focus on phonatory mechanism
  – Patients lengthens sounds with slowed & controlled transitions

• Controversial Findings
  – After treatment, observed unnatural sounding speech (Ingham & Oslow 2001)
  – Effective at behavioral level; unclear effect on brain circuitry (Neumann 2004)
Treatment implications

• Stuttering therapy increased activity in left motor strip
• The patients were able to produce speech more automatically and self-corrected
• Depended less on cognitive and linguistic skills-less conscious thought
• Study concluded treatment should focus on motor speech planning, sequencing, and execution
  • (Neumann et al. 2003)
Treatment targeting feedback

• Rate of speech
  – feedback to cerebellum and compensates for problems with basal ganglia
    • i.e. metronomic speech & chorus speech

• Conscious attention of articulatory mechanisms
  – provides sensory & motor feedback leading to increased activation in motor & sensory cortex
    • Compensates for problems with basal ganglia
    • i.e. Muscle tension reduction
Drug Therapy

• Controversy
  – Theophylline = induced stuttering

• Successful treatment
  – Levetiracetan
    • Successful in treatment patients with neurogenic stuttering due to epilepsy

• Needs further research
Timing of Treatment Sessions

• Residential Programs
  – Intensive therapy for short duration

• Outpatient Treatment
  – Longer duration with less intensity

• Pros and Cons
  – Dependent on individual needs
Conclusion

• Limited research
• Controversial Findings
  – No localized lesion vs. localized lesion in brain
  – Characteristics
  – Treatment Approaches
    • Cognitive vs. Motoric
• There is a need for continued research in neurogenic stuttering
References


