Exploring the Relationship Between Treatment and Causal Theory in Stuttering

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Overview

• Verbal communication and complexity theory

• “What causes stuttering?”
  – causal models/theories
  – P&A 3-factor model

• Do our treatments for stuttering address cause?
Spoken language

• The most complex thing we humans do
  – thinking up we want to say
  – constructing the language to say it
  – programming this into motor gestures (syllables)
  – 4-6 syllables per second, each one unique
  – all this, taking into account
    • conversational partner
    • topic
    • purpose
    • context
Verbal communication and complexity theory
Packman & Kuhn (ODC, 2008; IJSLP, 2009)

- Complexity theory/sciences
  - nonlinear
  - initial condition and the “butterfly effect”
  - self-organising and dynamic
“What causes stuttering?”

• Many models and theories
  – Systems control modeling
    • Sensory Motor Modeling Theory
    • Neuroscience Model
    • Variability Model (Vmodel)
  – Speech motor control
    • Syllable Initiation Theory (SI Theory)
    • Interhemispheric Interference Model
Models and theories (cont.)

– Cognitive and linguistic processing
  • Neuropsycholinguistic Theory
  • Covert Repair Hypothesis
  • Suprasegmental Sentence Plan Alignment Model
  • EXPLAN

– Multifactorial
  • Demands Capacities
  • Dynamic Multifactorial Model
Let’s talk about cause

• Cause = necessary and sufficient conditions

• Individual instances of a phenomenon can have triggers, e.g. bushfires
Rather than asking…

“What causes stuttering?”

we ask…

“What causes a moment of stuttering?”
The Packman & Attanasio (P&A) 3-factor causal model of moments of stuttering
Packman (ODC, 2011; JFD, 2012; Enfance, 2013)

1. **Necessary**
   neural processing problem

2. **Trigger**
   features of spoken language

3. **Modulators**
   inherent to the individual
P & A 3-factor model

**TRIGGER**
Inherent features of spoken language
- variable syllabic stress
- linguistic complexity

**IMPAIRED NEURAL PROCESSING**
for spoken language
- physiological arousal
- cognitive demands

**MODULATORS**
FACTOR 1
Neural processing problem

- **Functional**
  - Activations & deactivations

- **Structural**
  - Volume
  - Diffusion Tensor Imaging (DTI)
Putting together the findings of recent imaging and genetic research
Cykowski et al. (NeuroImage, 2010)

Hypothesis:

The neural processing problem underlying stuttering is incomplete or late myelination of the white fibre tracts subserving the production of spoken language
FACTOR 2

Variability of syllabic stress

Packman et al. (CLP, 1996)
FACTOR 2:
Effects of linguistic complexity on motor stability

see Smith and colleagues (JSLHR, 2000)

“Buy Bobby a puppy”

“You buy Bobby a puppy now if he wants one”
FACTOR 3
Modulators

Alm (JFD, in press), Eggers et al. (JFD, 2013), Jones et al. (JCD, 2014), Metten et al. (Dis. Rehab., 2011)

• Determine the triggering threshold
  – physiological arousal
    • Anxiety? Excitement? Temperament?
    • influenced by environment
  – cognitive demands
    • multi-tasking
Evaluating the P&A 3-Factor Model

• Explanatory power?
  - Stuttering not normal disfluency
  - Onset and development
  - Topography
  - Natural recovery
  - Variability

• Testability?
• Parsimony?
• Heuristic value?
Do our treatments for stuttering address cause?

Behavioral treatments designed to reduce stuttering
DIRECT  INDIRECT

TRIGGER
Inherent features of spoken language
- variable syllabic stress
- linguistic complexity

MODULATING FACTORS

IMPAIRED NEURAL PROCESSING for spoken language
- physiological arousal
- cognitive demands

A MOMENT OF STUTTERING

OTHER TREATMENTS
PSYCHOLOGICAL (incl. CBT)
PHARMACEUTICAL

Do our treatments for stuttering address cause?
Theory and therapy

Should theory drive therapy?

Can therapy drive theory?
Thank you!  Dankjewel!


