RESEARCH INTO ALEXANDER TEACHING METHODOLOGY & EXPLAINING THE ALEXANDER TECHNIQUE TO CLINICIANS & SCIENTISTS

PSYCHO-PHYSICAL RE-EDUCATION: AN INTRODUCTION TO COGNITIVE-MOTOR SYSTEM-LEVEL CAUSES OF PERFORMANCE-RELATED PROBLEMS

Alison Loram
(ARCM, DipRCM, BSc, MSc, PhD)
Royal Birmingham Conservatoire of Music, Birmingham
This talk presents material from the following sources:

*Chronic Profession-limiting problems in musicians: Underlying mechanisms & neuroplastic routes to recovery.*
MSc thesis, Division of Surgery & Interventional Science, University College London, UK. [http://dx.doi.org/10.17613/M6CN7R](http://dx.doi.org/10.17613/M6CN7R)

*Postural control & sensorimotor integration.*

*Proactive Selective Inhibition Targeted at the Neck Muscles: This Proximal Constraint Facilitates Learning & Regulates Global Control.*
IEEE Transactions on Neural Systems & Rehabilitation Engineering 25: 357-369. [http://dx.doi.org/10.1109/TNSRE.2016.2641024](http://dx.doi.org/10.1109/TNSRE.2016.2641024)

*Real-Time Ultrasound Segmentation, Analysis & Visualisation of Deep Cervical Muscle Structure;*
IEEE Transactions on Medical Imaging 36: 2. [http://dx.doi.org/10.1109/TMI.2016.2623819](http://dx.doi.org/10.1109/TMI.2016.2623819)
Violinist
Alexander Teacher
Research Scientist
How the Alexander Technique is perceived

- Difficulty in communicating what it is about
- Principles not established/demonstrated
  - little documented evidence of effectiveness
- Not taken seriously
  - regarded as alternative therapy, posture/movement discipline
  - perceived as encroaching on other people’s “patch”
  - “bottom of the pile”
The Alexander Technique has a scientific basis & deserves to be taken more seriously

- general mechanism which underlies many problems
- the neck is important in regulating sensory-motor control
- problems are associated with a common pattern of unnecessary movement & muscle tension
- students taught
  - to observe pattern of movement/muscle activity
  - to use as a training signal to regulate thought & activity
Outline

- Scientific basis of the Alexander Technique
- Research into Alexander teaching practice
- Explaining the Alexander Technique to clinicians/scientists
Problems: diagnosed & treated specifically

Musculoskeletal

- inflammatory conditions
  - rotator cuff syndrome
  - *supraspinatus* impingement/tendinopathy
  - adhesive capsulitis (“frozen shoulder”)
  - lateral epicondylitis (“tennis elbow”)
  - medial epicondylitis (golfer’s elbow”)
  - de Quervain’s tendinitis
  - non-specific arm pain (“RSI”/”overuse”)

- nerve entrapment syndromes
  - thoracic outlet syndrome
  - carpel/radial/cubital tunnel syndrome (median/radial/ulnar nerve entrapment)

- dystonias

Non-musculoskeletal

- cognitive/psychological
  - (performance) anxiety
  - depression

- “other”
  - breathing/respiratory-related
  - ear/hearing-related
  - eye/vision-related
  - embouchure (musculoskeletal?)
  - headache
  - sleep disturbances

- skill acquisition/technique
  - inability to progress
  - technical limitations
A general mechanism:

Problems arise from

- misconception,
- the rules of neuromuscular function
- lack of awareness
- reinforcement (wind-up) of symptoms
A general mechanism: problems arise from misconception, the rules of neuromuscular function, lack of awareness & reinforcement (wind-up) of symptoms

Perception-Selection-Action Feedback loop

A general mechanism: problems arise from misconception, the rules of neuromuscular function, lack of awareness & reinforcement (wind-up) of symptoms

Responses selected have consequences

- poor selections have adverse effects
  - performance
  - neural adaptation
  - biomechanical loading

- feedback can amplify or diminish effects of poor selection

Cause of poor selection = misconception
Working hypothesis:
The mechanical structure of the human body & the organisation of the neuromuscular system ensures that almost any misconception results in a common unnecessary musculo-kinematic pattern

General solution lies in:

- identifying the musculo-kinematic pattern that reveals the “poor” conception & motor response
- external indirect feedback to minimise poor selections of thought & movements which are unnecessary & made automatically
A scientific investigation into violin & viola playing

Aims

- To establish whether instrumentalists exhibit a common diagnosable pattern of movement & muscle tension
  
  i. what do violinists do when raising, supporting & playing their instruments?
  
  ii. are all elements normally adopted necessary to playing?

- To test methodology for reducing that pattern in individuals
  
  iii. the effect of proactive selective inhibition targeted at the neck muscles
  
  iv. the effect of verbal feedback of unnecessary movement & muscle tension
Procedures

Recorded

- movement
- muscle activity

- 16 violinists/
  5 viola players
Experimental Design

Tasks

▪ picking up & playing violin

Series

A - normal playing
B - playing laboratory violin with US probe attached
C - playing while focussing on an object
D - playing while describing the changes in neck muscle shape
E - playing using ultrasound feedback
F - playing using verbal feedback
Testing teaching methodology used with musicians

Series A: normal playing

Series F: verbal intervention
Representative musculo-kinematic pattern: transition from standing to playing configurations

Series A: normal playing

- Raising & pulling forwards the shoulders
- Axial rotation of the torso
- Flexion of the neck
- Increased kyphosis
- Increased lordosis

Series A (normal playing) without intervention – one participant
Common musculo-kinematic pattern: transition from standing to playing configurations

Series A: normal playing

- Raising & pulling forwards the shoulders
- Axial rotation of the torso
- Flexion of the neck
- Increased kyphosis
- Increased lordosis

Series A (normal playing) without intervention – mean
(n = 105 i.e. 21 players, 5 tasks)
Mean - Series A: normal playing

Mean - Series F: playing after verbal feedback
Pattern of unnecessary movement removed by verbal feedback

Neutral
Pattern of unnecessary movement removed by verbal feedback

Unnecessary movement
Pattern of unnecessary movement removed by verbal feedback

Neutral
Pattern of unnecessary movement removed by verbal feedback

Unnecessary movement
Ultrasound & verbal interventions reduce cost of movement

Discriminant Function Analysis

• Verbal feedback has a greater effect than ultrasound feedback
Ultrasound & verbal interventions reduce cost of movement

Discriminant Function Analysis

- Verbal feedback has a greater effect than ultrasound feedback

- Reduced muscle activity, skin conductance, chin rest compression
Reductions in neck muscle action, most muscle activities & skin conductance
A scientific investigation into violin & viola playing

Demonstrated

- Violinists exhibited a common observable pattern of unnecessary movement & muscular tension
  - associated with chronic pain, injury, lack of facility
- Proactive selective inhibition targeted at the neck (US) reduced the pattern
- Verbal feedback was more effective in achieving same result
Explaining the Alexander Technique to clinicians & scientists

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“Use” is the processes of sensory analysis, response selection, motor generation & movement biomechanics acting simultaneously & adapting through time according to their input

(Loram A., 2013)
“Misuse”
= suboptimal processes of sensory analysis, response selection, motor generations & movement biomechanics amplified by misconception of the feedback

(Loram A., 2013)
The Alexander Technique brings about change by external input into perception, & inhibition of automated responses

- breaks loop at point of selection
- indirect external inhibitory feedback removes poor, *a priori* selections
- problems resulting from misuse ameliorated/avoided

(Loram A., 2013)
Definition of the Alexander Technique?
Psycho-physical re-education on a *general basis*

- **Technique** - rather than a philosophy
  (based on observation of mechanical efficiency/movement)
- **Education** - learned
  (not a treatment or a therapy)
- **Re-education** – refining, regulating & relearning what you have already learned
- **Psycho-physical** – processes (perception, selection (choice), motor action, mechanical performance) are simultaneous
- **General basis** – our system works as a whole
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- students taught
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Contact details

Dr. Alison Loram: aloram7@gmail.com