

Planning Your Next Step: The Brain's Connection to Movement

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Physical Ergonomics

- Ergonomists generally deal with the ‘physical’ side of ergonomics:
 - Lifting, carrying
 - Pushing, pulling
 - Reaching
 - Standing, walking, sitting
 - Gripping

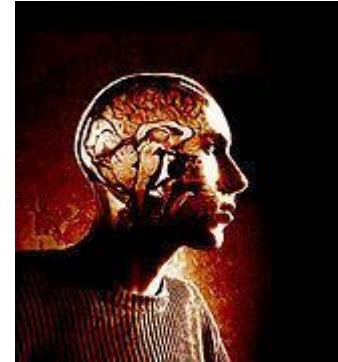


Cognitive Ergonomics

- Defined by the International Ergonomics Association (IE):
 - “Concerned with the mental processes, such a perception, memory, reasoning, and **motor responses**, as they affect interactions among humans and other elements of a system”.



Cognitive Side of Movement



- We neglect (or do not understand) the cognitive side of ergonomics.....our **BRAINS** connection to the physical side....
- Our brain controls ALL movements and some movements require more control than others...ie. Precision movement



Why should we care?

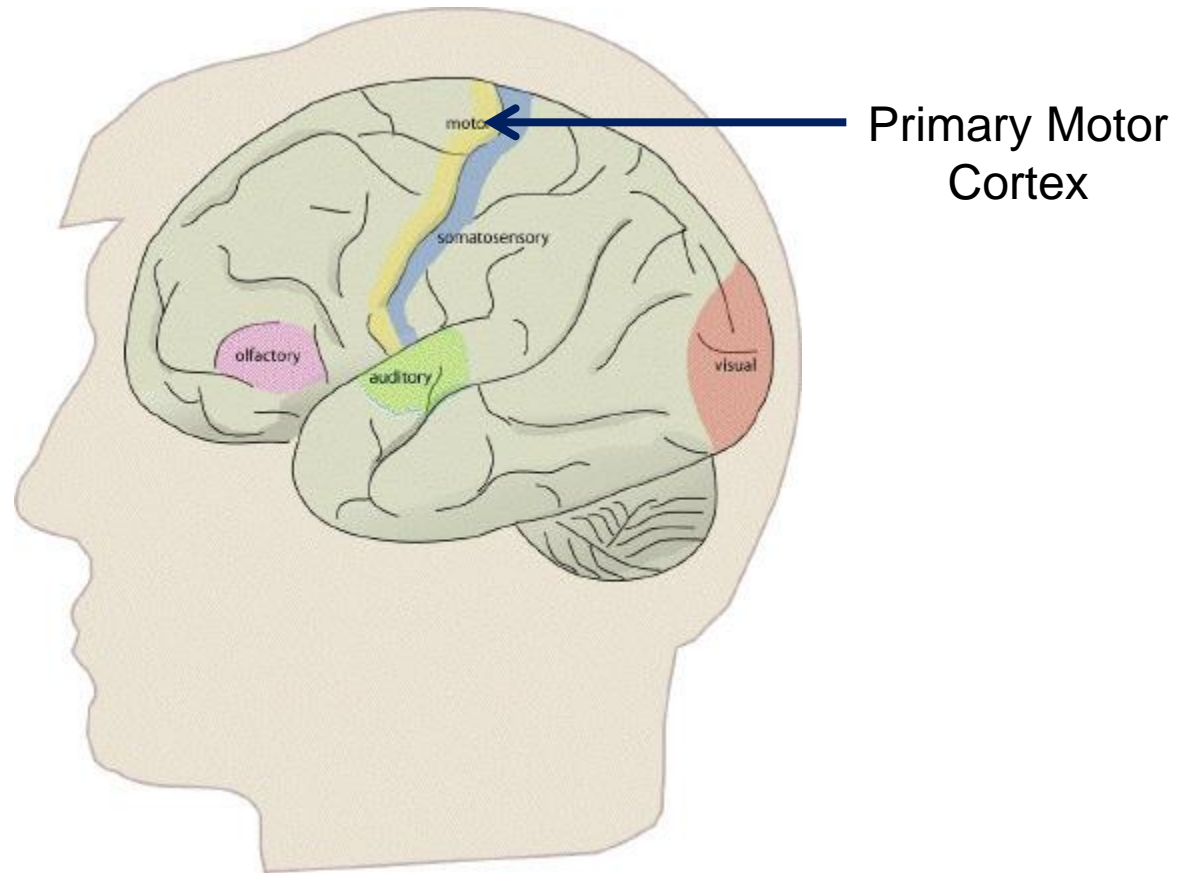
- Lack of consideration of motor control has implications for:
 - Designing jobs
 - Training
 - Making recommendations and changes; engineering vs. administrative controls
 - Injured workers
 - Age of workers; Aging Workers



We are CREATURES OF HABIT

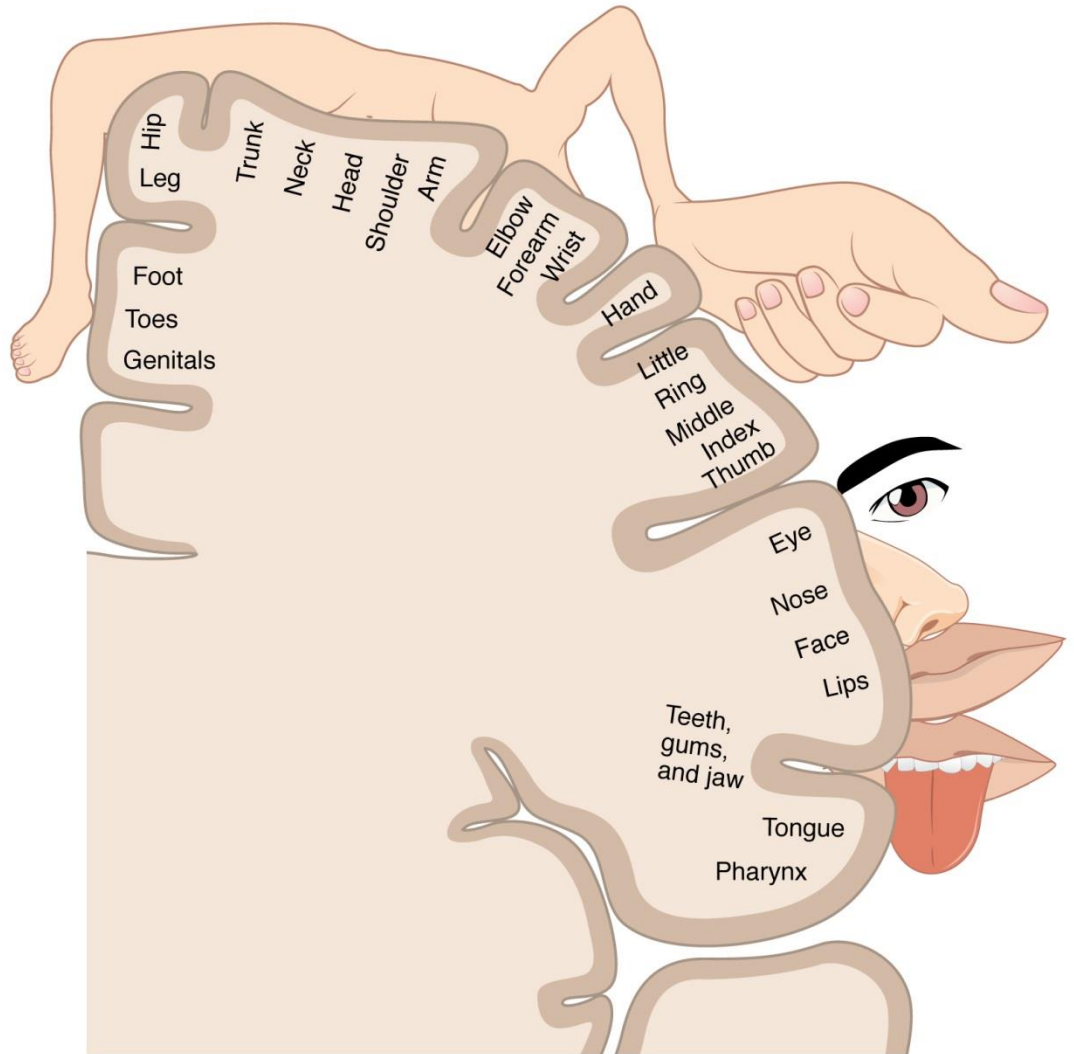


Where are movements controlled?



Motor Homunculus

- Develops over time and differs from one person to the next.
- The hand of an infant brain is different from the hand in the brain of a concert pianist.



How do we learn movement patterns

- Movement is organized by subconscious centres of the brain
- We rely on feedback (neural, proprioceptive, visual) to become 'skilled'
- Poor movement habits or an injury may lead to a change in the pattern through repetition of a **degraded movement**
- These movements patterns can become permanent and will feel **normal...they become habitual**



Automatic Behaviours



Habits

- Habits are not just **behavioural...** we can develop **movement habits or patterns** in the same way we develop patterns of behaviour.



Motor Behaviour

- When you do something over and over again, it eventually becomes **automatic**
- Once it's automatic, you can do it without much thought...it become a 'habit'
- The advantage of habits...it allows you to devote your brain power to other tasks – you can **multi-task**
- Movement patterns become **unconscious**



Changing Motor Behaviour

- Changing a pattern, once ingrained, requires more work than establishing the pattern in the first place
 - Estimated that 10 times the initial number of repetitions to over-write the existing pattern
 - It can take about 300 repetitions to **'ingrain'** a new movement pattern depending on its complexity (ie. Proper lifting patterns)



Time period to learn a new habit

- Time for a habit to form – anywhere from 18 to 254 days (on average...66 days) – period of time depends on the *difficulty* of the activity being learned and the level of *commitment* on the part of the individual

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Movement Patterns for MMH Implications for training...



How to change a 'habit'

- You need to break the **unconscious automatic** hold – you must **activate the thinking part of your brain**
 - Therefore you have to override your habit at the subconscious level
 - At first you may have some **physical and/or psychological discomfort** – you **MUST** get out of your ***comfort zone!!*** No one likes to be uncomfortable!



Strategies for Change

- First and foremost, you need to recognize and acknowledge the ***need*** for change.



Strategies for Change

- Work design – ensure the job design is appropriate (neutral postures, acceptable force requirements, etc)
- Worker training – ensure workers are trained to use the correct movement patterns
- Equipment changes – ensure appropriate time for workers to adapt to the changes if different movement patterns are required



Strategies for Change

- Employ the use of positive feedback to assist with changes
- Utilize ‘tools’ to assist with bringing the changes in to your consciousness to ingrain the new movement pattern
 - Visual
 - Auditory
 - Repetition



Tools for Change

- <http://www.workrave.org/screenshots/>



Questions??



Thank You

**If you have any questions about this presentation,
please contact me at the email/number below**

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