



Re-Train Your Brain

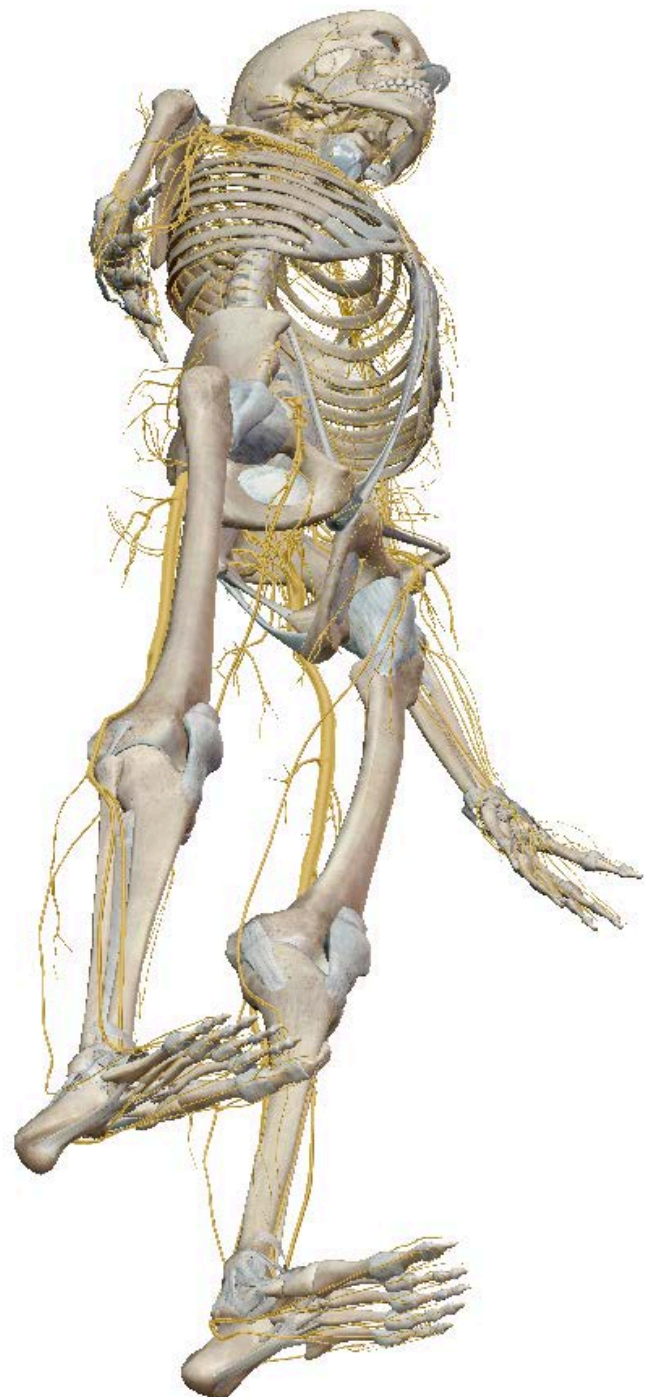
Using Graded Motor Imagery


&

Motor Control

A Case Study

Mark Butler, PT, DPT, OCS, Cert. MDT



A conceptual illustration of a brain with arms and legs running on a treadmill. The brain is depicted with a textured, grey surface, and its limbs are extended in a running motion. The treadmill is a simple, light-colored exercise machine. The entire scene is set against a plain white background.

Contemporary “evidence-based” rehabilitation recommendations

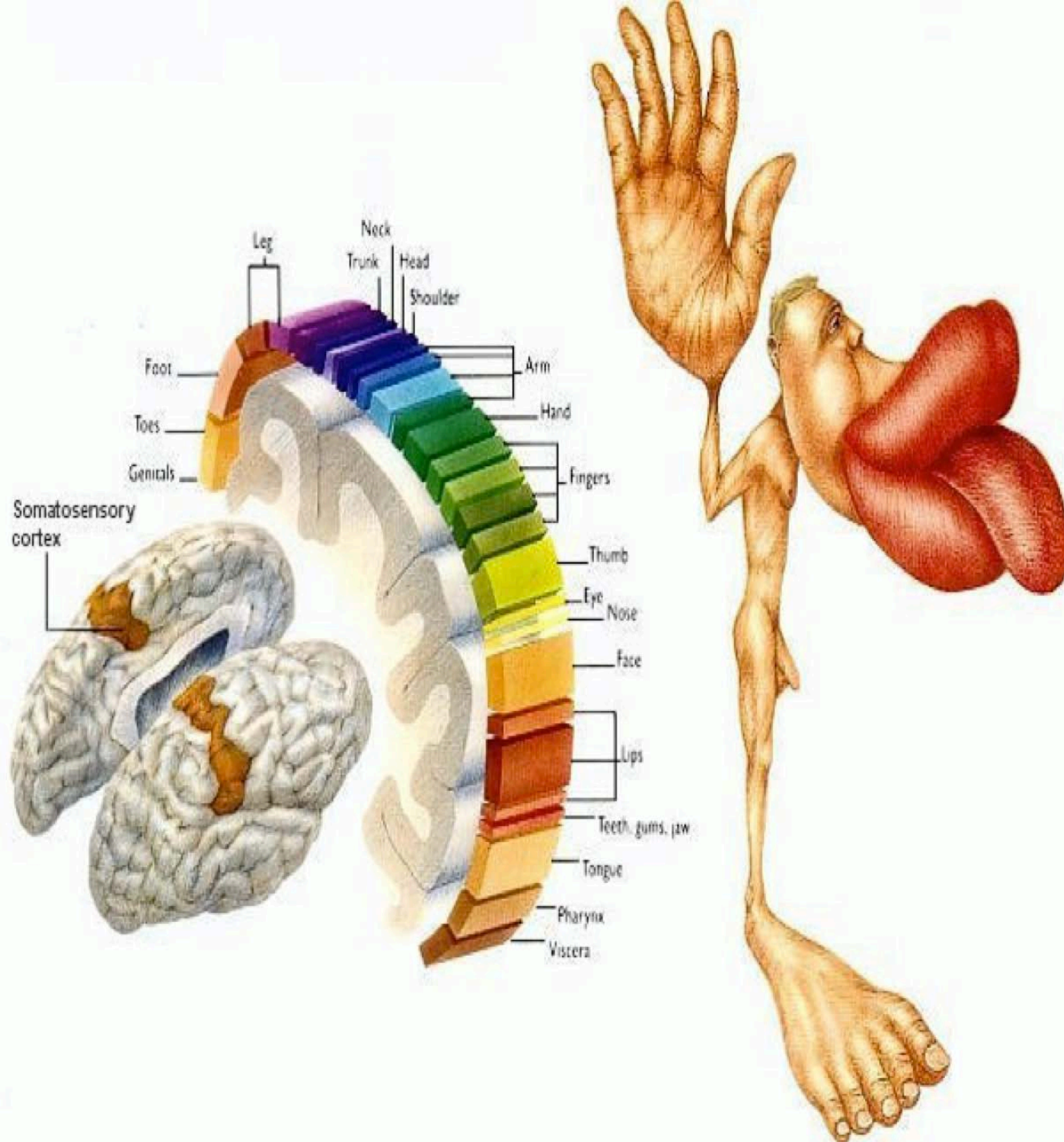


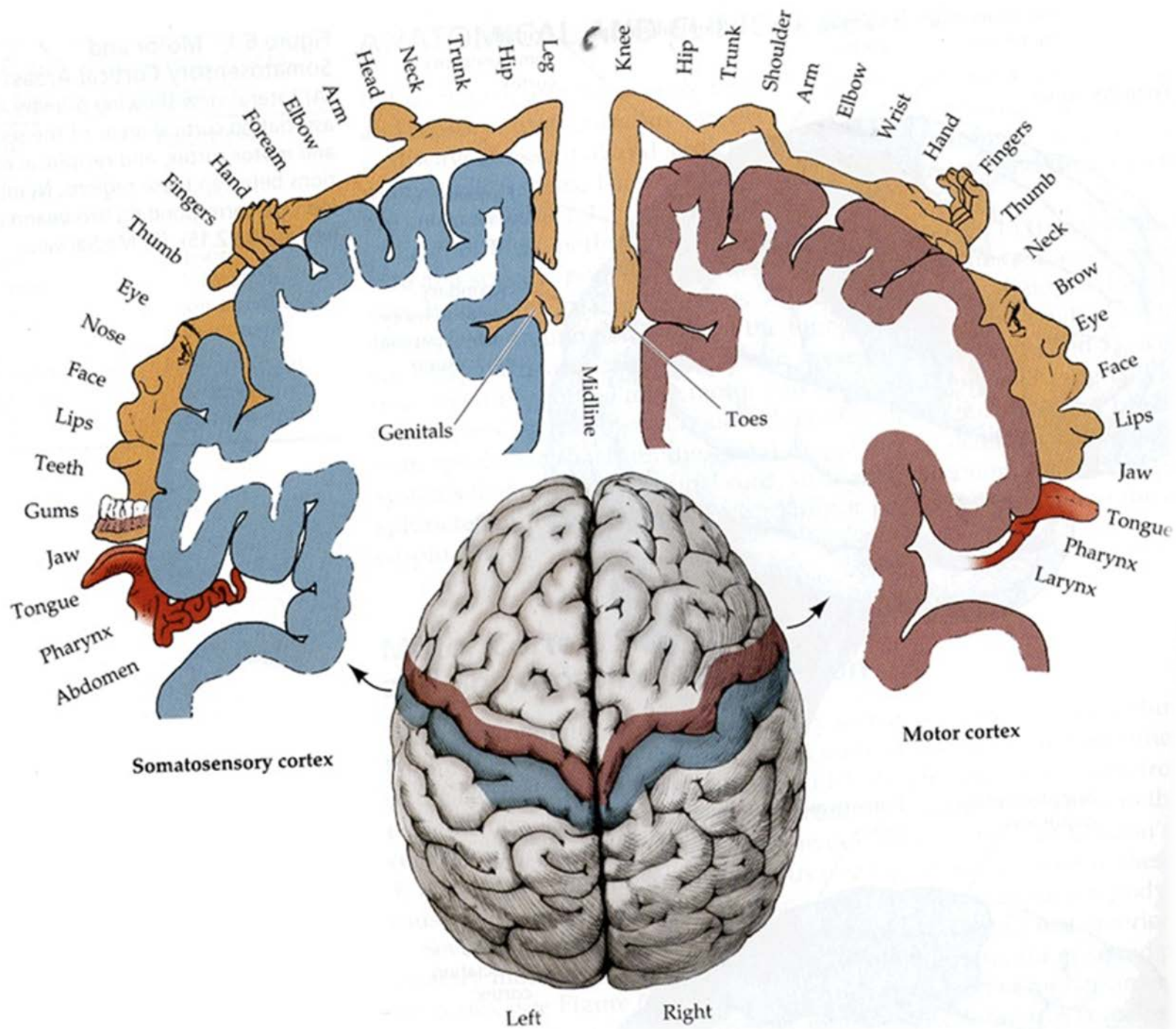
A 3D rendering of a human brain with arms and legs, depicted as if it is running on a treadmill. The brain is white and has a realistic, textured appearance. It has two arms and two legs, all of which are in motion, suggesting a running gait. The treadmill is a simple, modern design with a black belt and silver frame. The background is a plain, light gray.

The Homunculus

=











A 3D rendering of a human brain with arms and legs, depicted as if it is running on a treadmill. The brain is white and textured, with visible gyri and sulci. It has two arms and two legs, all in a running motion. The treadmill is a simple, light gray structure. The background is plain white.

True or False:

I have nerves that send
pain signals

Acute Pain



- Unimodal nociceptors
 - Rapidly adapting
 - Creates rapid behavior change
- Polymodal nociceptors
 - Enhanced by chemicals released through inflammation
 - Creates lingering “pain” experience

Protective role to limit further tissue damage

Chronic Pain

A conceptual illustration of a brain with human-like arms and legs running on a treadmill. The brain is depicted with a textured, grey surface, and its limbs are also grey. It is in a running posture on a white treadmill. The background is a plain, light grey.

- Brain's response
 - Nociception enhanced
 - Sensory processing altered
 - “Pain” blocking signals malfunction
 - Pain facilitating pathways enhanced

Chronic pain has no value

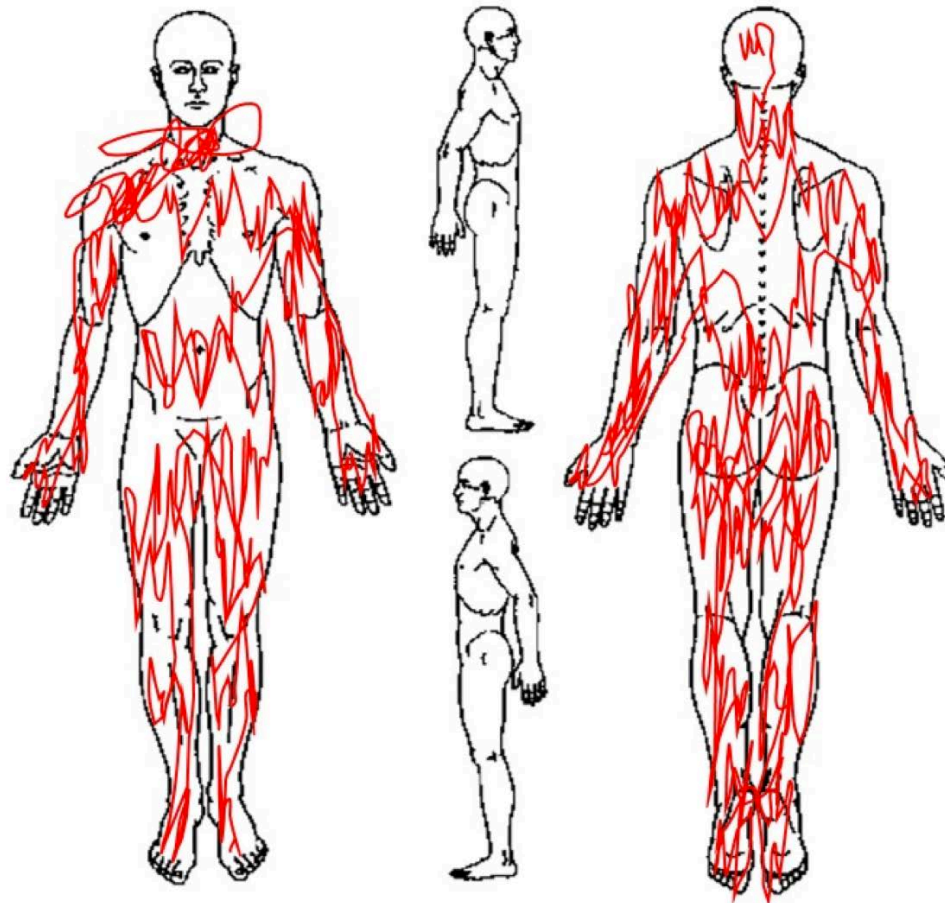
The Brain in Pain

PAIN DIAGRAM

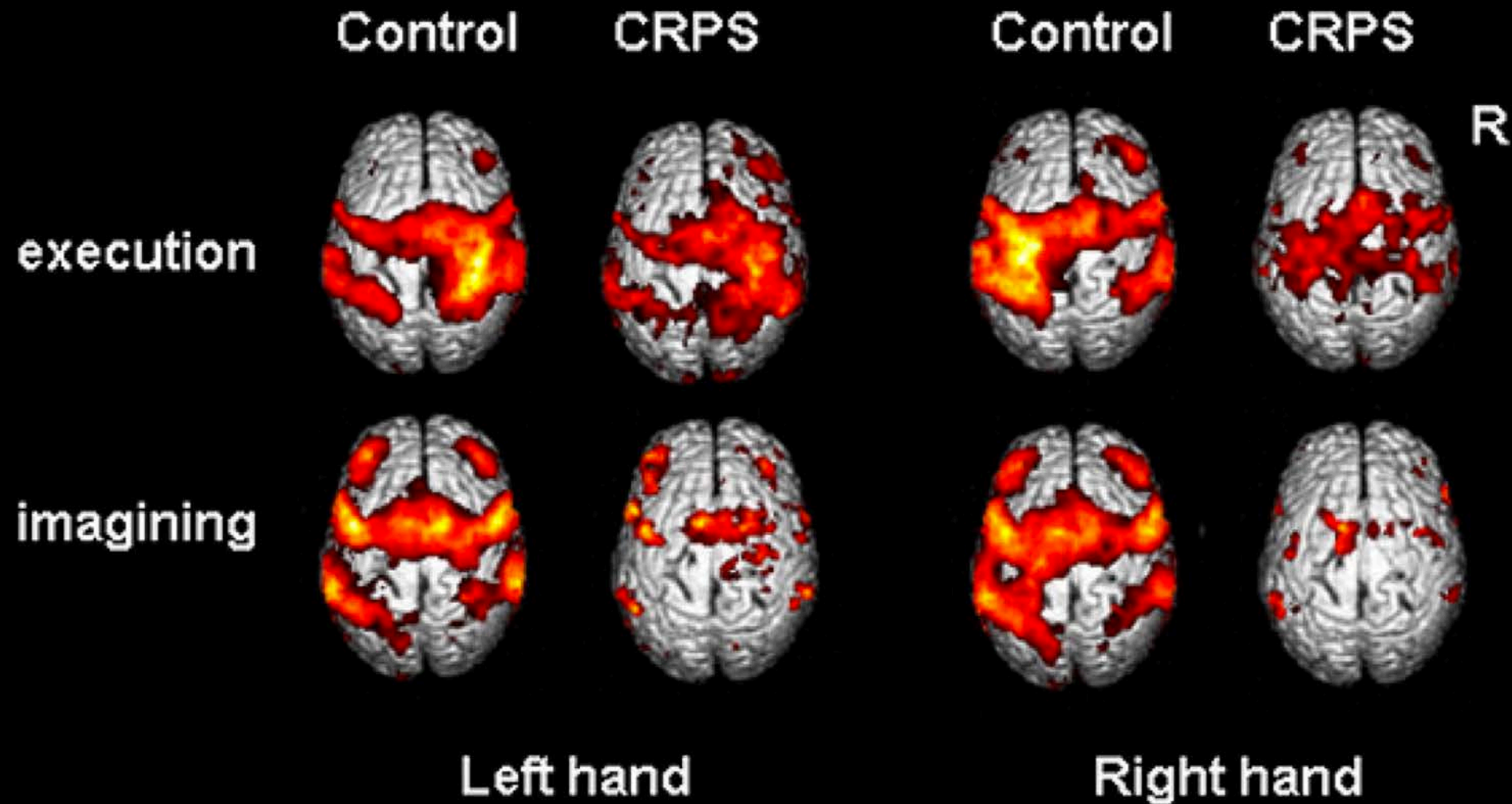
PATIENT'S NAME _____

On the diagram below, please indicate where you are experiencing pain or other symptoms. Use the following to describe your symptoms:

A = Ache B = Burning N = Numbness P = Pins & Needles S = Stabbing O = Other

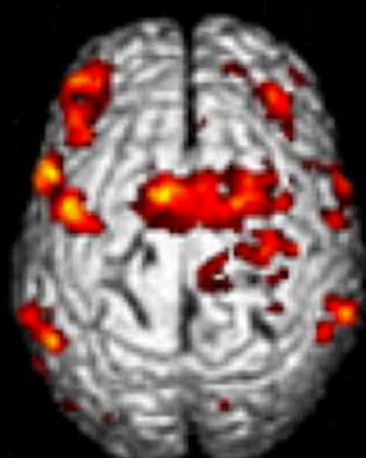
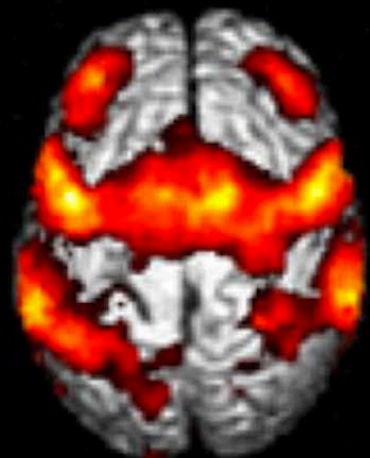
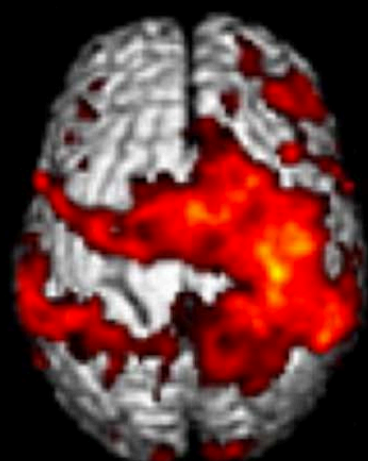
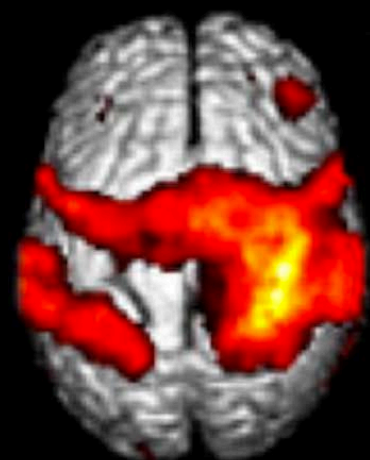


fMRI During Wrist Extension



Control

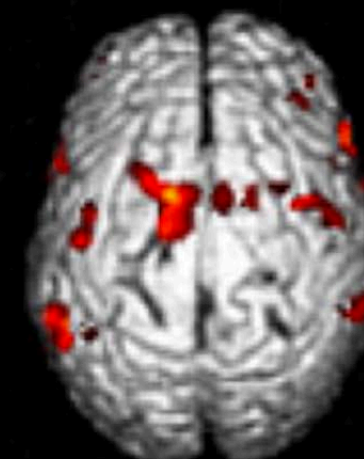
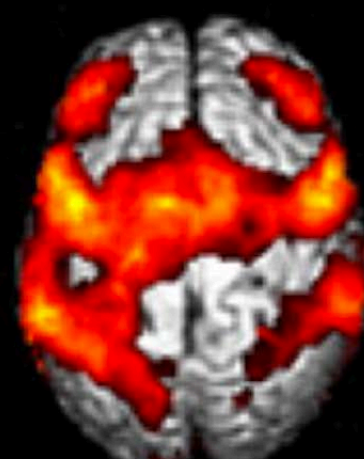
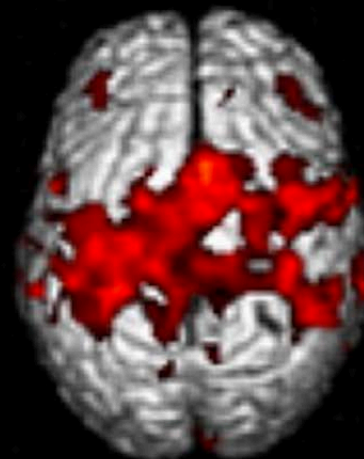
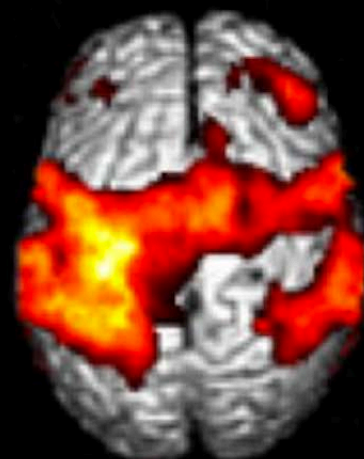
CRPS



Left hand

Control

CRPS



Right hand

Case Study



- Female in early 40's
- Dog grooming manager at large pet store chain
- Ulnar nerve injury from dog bite Aug 2013
- Therapy until Nov 2013
- Ulnar nerve release Nov 2013 – poor outcome

- D/C to pain management, started injection Rx – CRPS/RSD diagnosis – Sept 2014
- Entered 2nd round of PT end of 2014
- Close to MMI 6 month later
- Referred to me by pain management Dr.







Testing



Recognise...



recognise



RecogniseFoot



Back

Recognise



Recognise...



recognise



RecogniseFoot



Back



5:21 AM



< back

recognise



left or right?

LEFT

RIGHT



5:23 AM



< back

recognise



left or right?

LEFT

RIGHT

< back

recognise



quick test

basic

vanilla

context

abstract

my images



< back

recognise



basic

5

current pain level

5

time per image

10

no. of images

GO



8:00 PM



< back

recognise



left or right?

LEFT

RIGHT



8:00 PM



< back

recognise



left or right?

LEFT

RIGHT

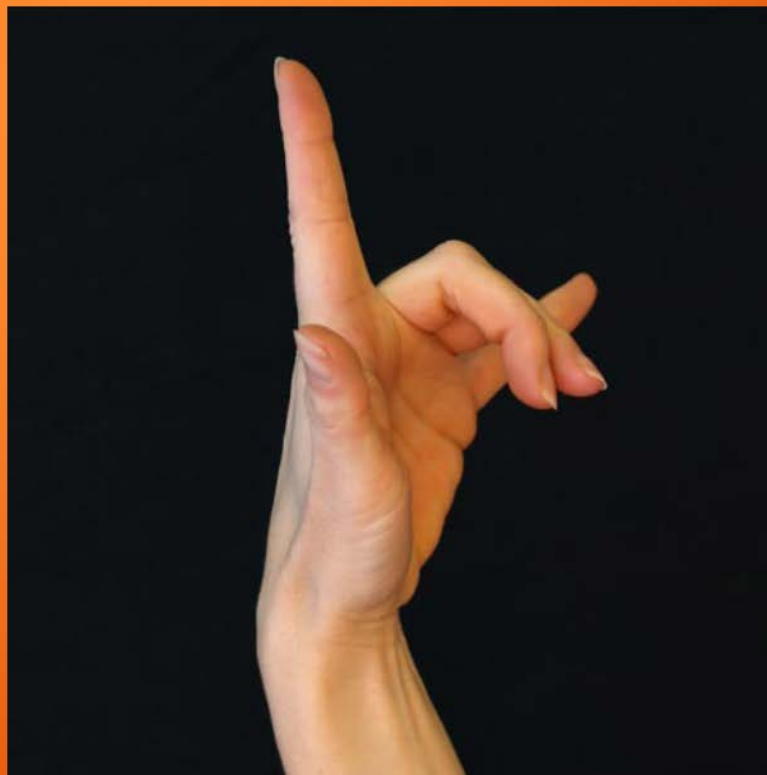


8:00 PM



< back

recognise



left or right?

LEFT

RIGHT



8:00 PM



< back

recognise



left or right?

LEFT

RIGHT



8:00 PM



< back

recognise



left or right?





8:00 PM



< back

recognise



left or right?

LEFT

RIGHT



8:00 PM



< back

recognise



left or right?

LEFT

RIGHT



8:00 PM



< back

recognise



left or right?

LEFT

RIGHT



8:00 PM



< back

recognise



left or right?

LEFT

RIGHT



8:00 PM



< back

recognise



left or right?

LEFT

RIGHT

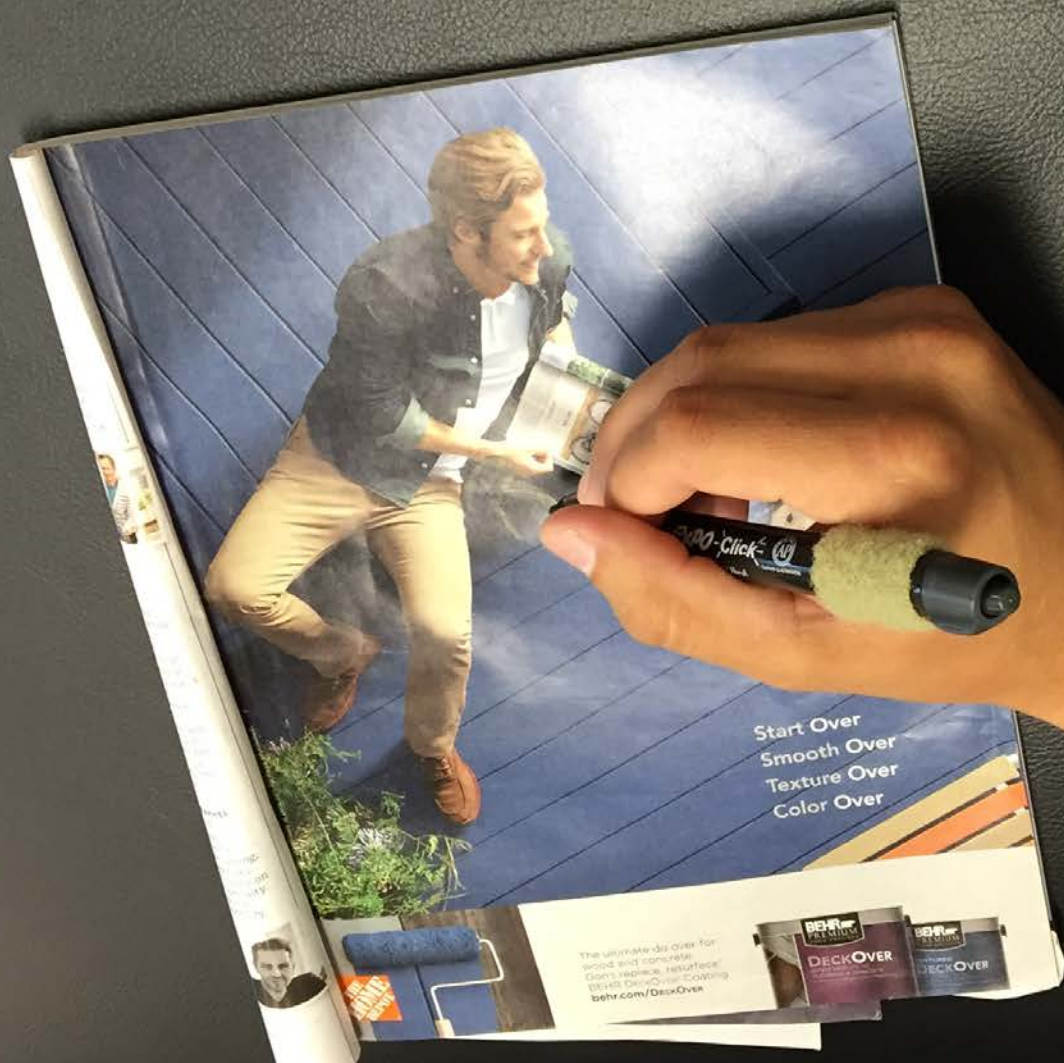
A 3D rendering of a human brain with arms and legs, depicted as if it is running on a treadmill. The brain is white and textured, with visible gyri and sulci. It has four limbs, each ending in a simple hand or foot. The treadmill is a light gray color with a black running belt. The background is a plain, light gray gradient.

Re-Training



A 3D rendering of a human brain with arms and legs, depicted as if it is running on a treadmill. The brain is white and textured, with four limbs extending from it. It is positioned on a white treadmill with a handrail. The background is a light gray gradient.

Phase I: Laterality



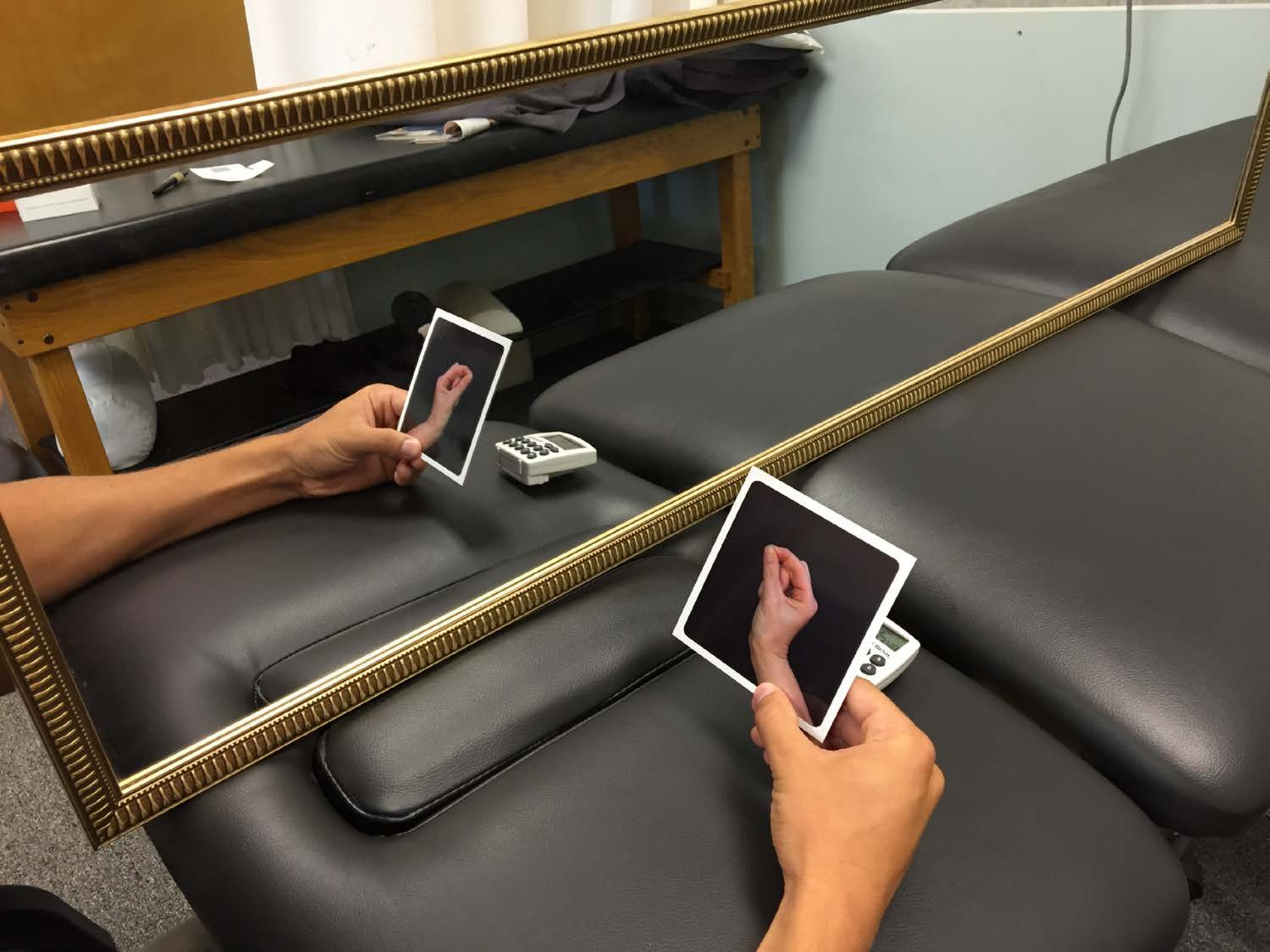
Start Over
Smooth Over
Texture Over
Color Over

The ultimate do-over for
wood and concrete.
Don't replace, re-surface!
BEHR DeckOver Coating
behr.com/DeckOver



A 3D rendering of a human brain with arms and legs, depicted as if it is running on a treadmill. The brain is white and textured, with its arms and legs also rendered in a light gray, semi-transparent style. The treadmill is a simple gray frame with a belt. The background is a light gray gradient.

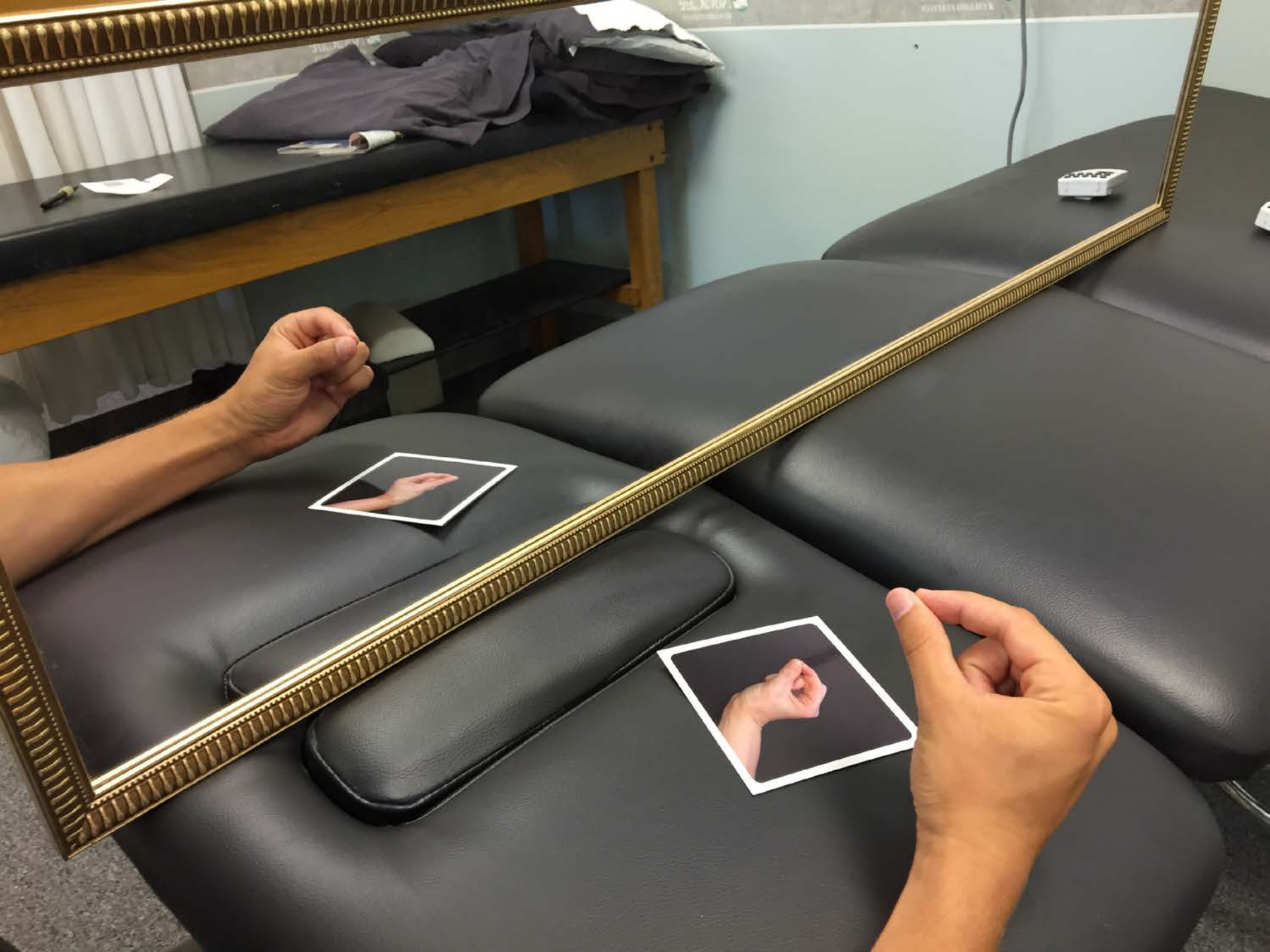
Phase II: Imagined Hand Movements



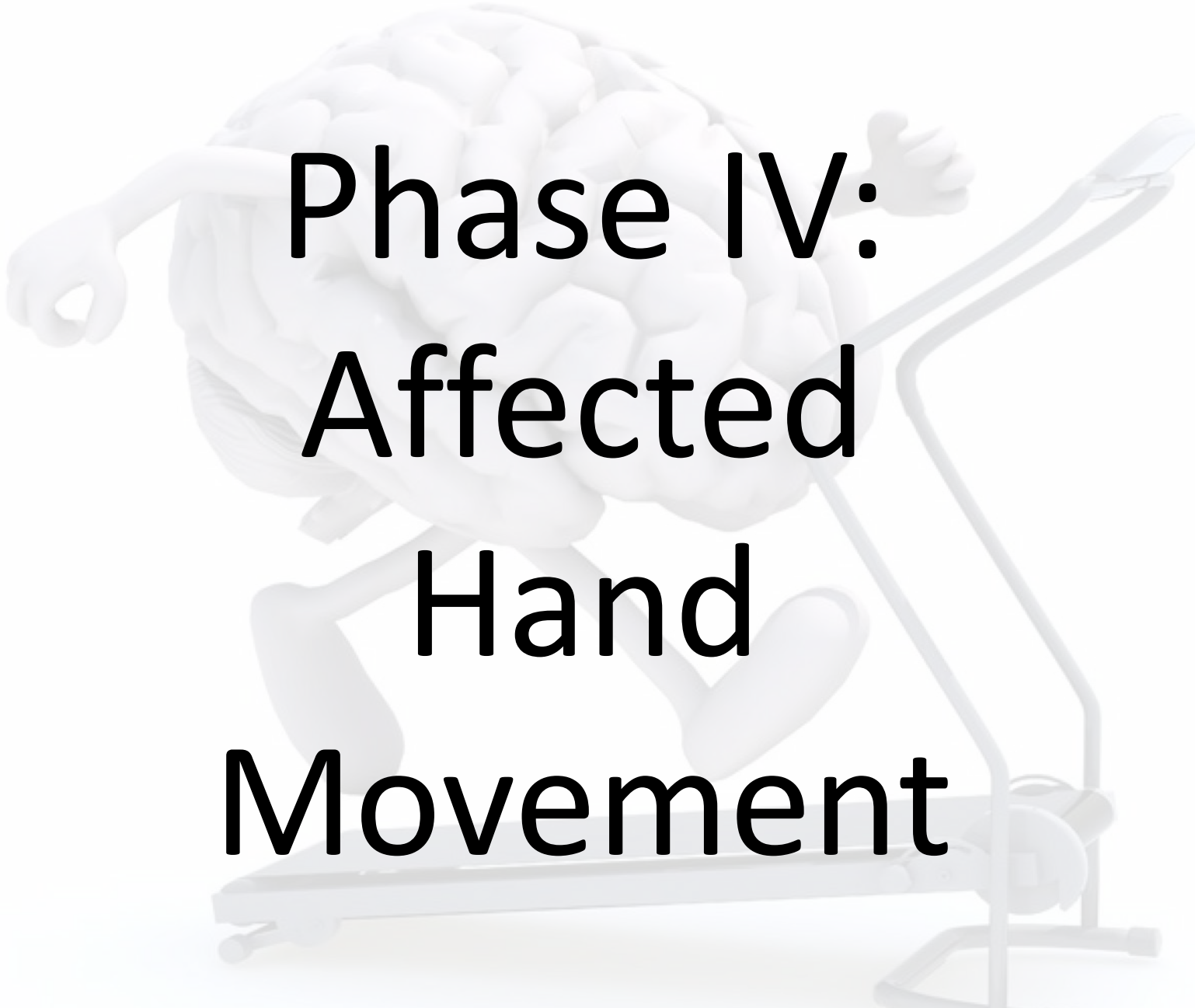


A 3D illustration of a brain with arms and legs, depicted as if it is running on a treadmill. The brain is white and textured, with two arms and two legs. It is in a running pose, with one leg forward and arms swinging. The treadmill is a simple grey frame with a black belt. The background is a light blue gradient.

Phase III: Unaffected Hand Movement





A 3D illustration of a human brain with arms and legs, depicted as if it is running on a treadmill. The brain is white and textured, with its arms and legs also rendered in a light gray, semi-transparent style. The treadmill is a simple gray frame with a black belt. The background is a light gray gradient.

Phase IV: Affected Hand Movement





What Next?



Crossing Midline















Critical Steps



- Stick to time lines
- Regress to last pain neutral level of work if pain occurs – stay there 2 weeks
- Remove all perception of danger from treatment
- Provide pain neutralizing strategies
- Treatment must be fun – exciting
- Foster independence



Questions?



Thank You

Answer Key

1. Left

2. Left

3. Left

4. Right

5. Left

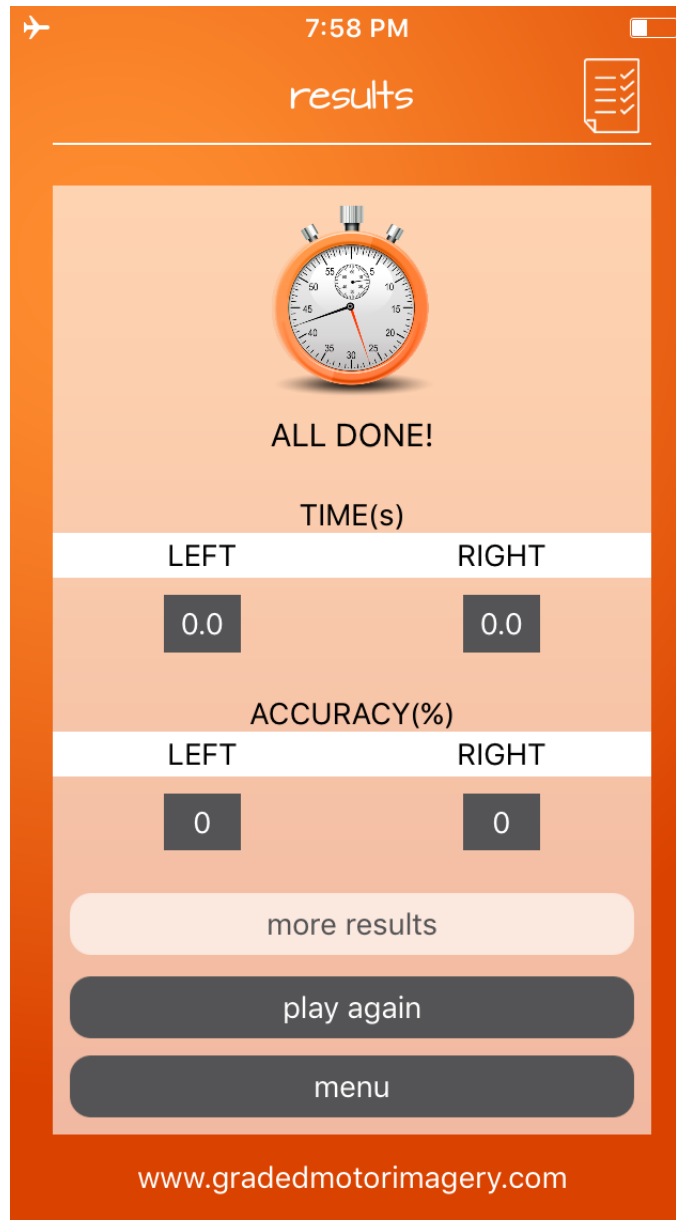
6. Right

7. Right

8. Right

9. Left

10. Right



References

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