On the Path To More Reliably Achieving Your (Everyone’s) Full Human Potential

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Our subject: The science of neuroplasticity, translated to help.

• The fundamental nature of brain plasticity

• A scientific **AND** technological revolution

• Harnessing the Genie
  – For enriching human lives
  – In the world of work
  – For extending brainspans and lifespans
  – As medicine
  – For growing cultural vibrancy
BRAIN PLASTICITY:
The basis of the brain’s creation of a model of your world, and of the control of your operations within it.
It’s all about personal **SPECIALIZATION**.

Note that plastic changes are **PHYSICAL**.
Let’s begin by comparing older to younger (rat or) human brains…

de Villers-Sidani et al., PNAS 2010

Mishra, de Villers-Sidani et al., in review, 2014

Older individuals were then sent to a ‘rehab center’ for brain training…..
The grand result: With simple forms of training in older (or younger, impaired) individuals **ALL** neurological abilities were substantially if not completely restored. Included on our list:

1. Local and long-track myelination
2. Excitatory & inhibitory response power & dynamics
3. Local response coordination/correlation
4. Cortical column sizes & boundaries
5. Parvalbumin inhibitory neuron numbers, vigor, morphologies
6. Inhibitory, excitatory, and modulatory receptor sub-types
7. Temporal response dynamics
8. Topographic order, precision
9. Response selectivity (receptive field size; feature extraction)
10. BDNF expression, function
11. Cortical thickness and neuropil volume
12. Cortical process ‘noise’
13. Distractor suppression
14. Successive-signal adaptation, adaptation to backgrounds
15. Modulatory neurotransmitter nuclei, transporters (ACh; DA; NE; SE)
16. Correlated gamma- & theta-frequency responses
17. Among other indices – all recovered at every examined system level.

An animal model example:

Young

Aged

Aged-T
A human model example: Frontal-sensory communication (theta phase coherence) **selectively strengthened for targets**, **AND** selectively reduced for distractors, by training.

Mishra, de Villers-Sidani et al, Neuron, 2014
Actually, **EVERY** neurological ability is improvable, **AT ANY AGE**.*.

* (i.e., until AD or related neuropathology gains a strong foothold)
How do you turn an old (or impaired) brain into a (physically and functionally) more capable ('younger') one?

*Nota bene:* Of course neurological rejuvenation will only be achieved with particular forms of training.
How do you turn a brain in the prime of life into an old one?

Just add noise.

Zhou et al, 2011, J Neurosci 31:5625

Going forward = Going backward.
To “Harness the Genie”, we’ve created:

1. Adaptive
2. Individualized
3. Efficient
4. Targeted
5. MANY training components
6. Embedded assessments
7. Proven to work
8. Clinically supported
9. APPs & portable, to bring training into your “real life”
10. Inexpensive
11. Scalable

The BrainHQ platform
Today's schedule for Don

To get the most out of your brain training experience, complete these exercises today. Each exercise will last about 5 minutes unless you opt to do more or less.

TARGET TRACKER  FREEZE FRAME  HAWK EYE  SOUND SWEEPS

ESTIMATED TIME

20 MIN

preferences

NEW EXERCISE

This icon indicates a new exercise in your schedule—one that you haven't done as part of your personalized training yet.

BUILD YOUR STRENGTH

Exercises labeled with this icon are ones BrainHQ recommends you repeat because they offer the greatest opportunity for improvement.

GRADUATED TO A NEW LEVEL

If you see this icon, it means you've improved at the previous exercise level and are moving up to a new one.
PERCENTILE OVERVIEW

Your ranking

<table>
<thead>
<tr>
<th>Skill</th>
<th>Percentile</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attention</td>
<td>84th +69</td>
<td></td>
</tr>
<tr>
<td>Brain Speed</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Memory</td>
<td>84th +67.25</td>
<td></td>
</tr>
<tr>
<td>People Skills</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Intelligence</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Navigation</td>
<td>82nd +84</td>
<td></td>
</tr>
</tbody>
</table>

The graph to the right shows how you compare with all the BrainHQ users who have provided their age and demographic information so far.

Learn more about how the comparison was done—and how to improve your standing.

WHAT NOW

Find a level in which you're at a lower percentile. Click on that level to launch it. Repeat it until it becomes one of your strengths.
We are applying this science...

...to try to give a kid every child a better start in life—or to make neurological corrections for them IF they had a difficult early life.

See Merzenich M (2013) Soft-Wired (see Amazon.com)
We are applying this science...

...to improve the quality of work, in cognitively and/or emotionally and/or physically demanding human professions.

See Merzenich M (2013) Soft-Wired (see Amazon.com)
We apply this science...

...to help citizens make the most out of their lives on earth; to grow their brain health, cognitive resilience, sustainable independence, and longevity.

See Merzenich M (2013) Soft-Wired (see Amazon.com)
An example of training an “average” human citizen
Todd Sampson, CEO, Leo Burnett, Australia

Brain response differences at a task for which Todd’s brain response power indexes his IQ...

Redesign My Brain (ABC Television)
Brain responses in visual cortical areas in a “cued attention task.” Activity differences show that training resulted in stronger, faster responses at every level of the visual processing machinery.

Why not adopt a “Todd Sampson approach” for growing the capabilities and prospects of EVERY individual.
A brain (life) as a rollercoaster
We are applying this science...

...to help the neurologically and psychiatrically struggling amongst us.

See Merzenich M (2013) Soft-Wired (see Amazon.com)
Medical conditions for which we are now applying brain plasticity-based training, to help…

<table>
<thead>
<tr>
<th>Medical Condition</th>
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</tr>
</thead>
<tbody>
<tr>
<td>2. Bipolar disorder</td>
<td>15. Autism</td>
</tr>
<tr>
<td>4. OCD</td>
<td>17. Parkinsons (prevention)</td>
</tr>
<tr>
<td>5. PTSD</td>
<td>18. Mild Cognitive Impairment</td>
</tr>
<tr>
<td>6. ADHD</td>
<td>19. Huntingtons (prevention)</td>
</tr>
<tr>
<td>7. Conduct disorders</td>
<td>20. Sleep disorders</td>
</tr>
<tr>
<td>8. Traumatic brain injury</td>
<td>21. Multiple sclerosis</td>
</tr>
<tr>
<td>9. Aphasia</td>
<td>22. ICU-induced cognitive loss</td>
</tr>
<tr>
<td>11. Alcohol Addiction</td>
<td>24. “Pumpbrain”</td>
</tr>
<tr>
<td>12. Psychopathy</td>
<td></td>
</tr>
<tr>
<td>13. HIV/AIDS</td>
<td></td>
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</table>

Abnormal is normal.
It’s all about APPLYING TECHNOLOGY TO COUNTERACT how culture and technology are impacting (in some ways enriching, but in other ways degrading) our brain health....

The modern “Zombie”, sleepwalking through life..

Living life without much of a requirement for a brain..
There is a clear path forward.
It’s all about applying this science to elevate us all.

It’s all about...

...transforming education, to help the struggling child & to more fully exploit human potential.

...redefining archaic “criminal justice” standards and practices.

...job training, with the brain in play.

...applying technology, to help offset all of those negative consequences OF technological advance.

...transforming neurological/psychiatric medicine

...making the most out of EVERY human life.
It’s all about applying this science to elevate us all.

It’s all about...

...raising ALL boats by applying strategies that anyone on the planet can use...

...using scalable strategies...

...that are AFFORDABLE.

This science, and our technological advances, now put these prospects for GREAT societal transformations within reach.
WE’LL HELP YOU.

And we need LOTS of help...

...for any (all) of this happen.