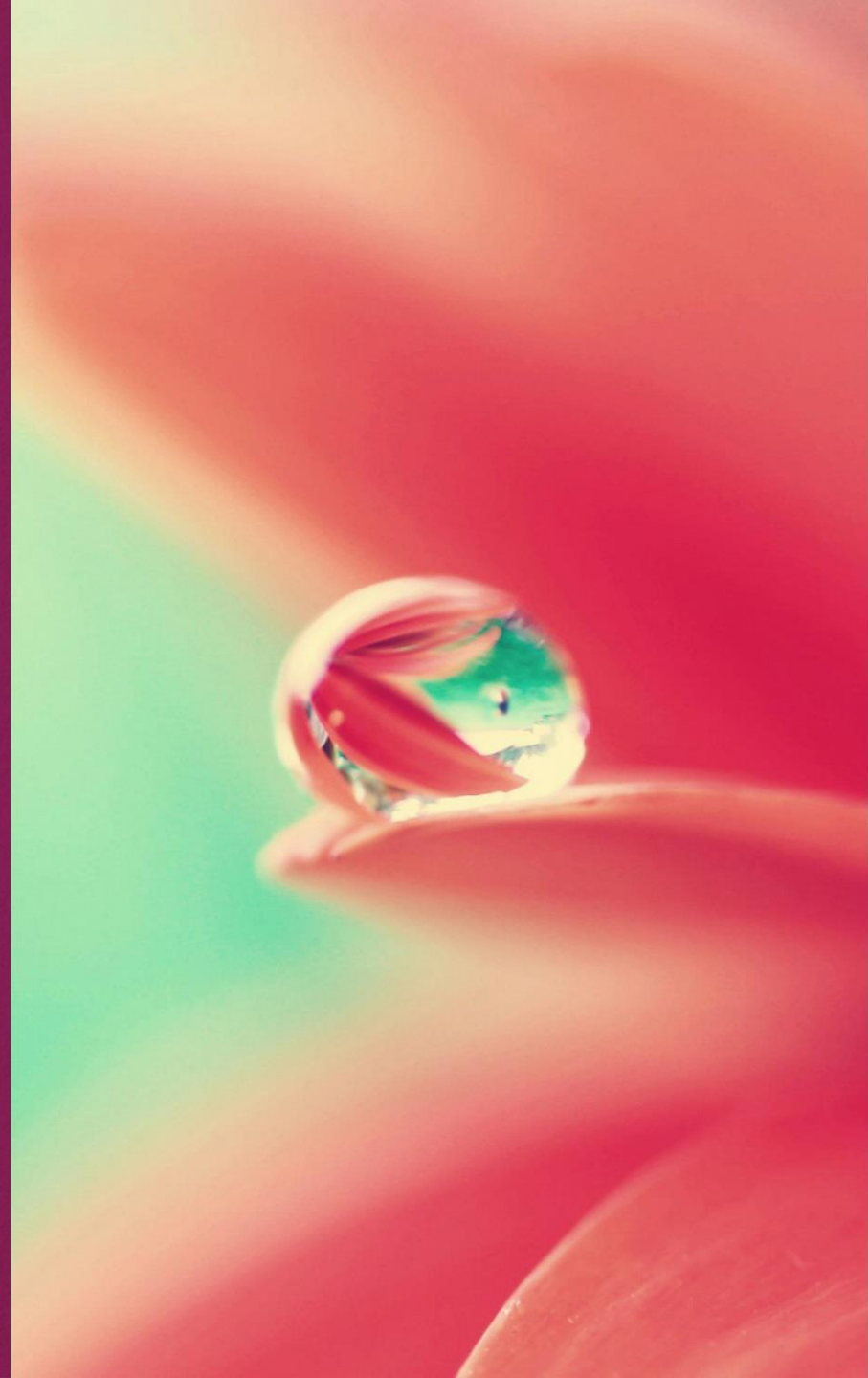


*Think not lightly of good,
saying,
“It will not come to me.”*

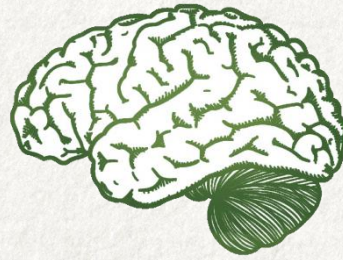
*Drop by drop is
the water pot filled.*

*Likewise, the wise one,
Gathering it little by little,
Fills oneself with good.*

Dhammapada 9.122



The Professional Training



In Positive Neuroplasticity

© Rick Hanson, Ph.D., 2021

Welcome to the Professional Training

Aims

Explain. Guide. Embody.

Deepen embodiment of positive neuroplasticity (PN)

Understand theory and have practical skills

Deepen supportive qualities

Use PN with others, typically in occupational settings

Methods

Internal practice, trying methods with a partner, small group discussion, whole group lecture and discussion

Presumed capabilities to work with others, give and get feedback skillfully, and basic understanding of PN



Questions?



1

Foundational Knowledge of Positive Neuroplasticity

What is the Practice of Positive Neuroplasticity?

**The deliberate internalization
of beneficial experiences**

**Informally called
“taking in the good”**



Growing Strengths

In the Garden of the Mind

1

**Be with what
is there**

2

**Decrease
the negative**

3

**Increase
the positive**

Witness. Pull weeds. Plant flowers.

Let be. Let go. Let in.

Recognizing. Releasing. **Resourcing.**

“Being with” is primary – but not enough.
We also need wise effort: releasing & resourcing.

Challenges, Vulnerabilities, Strengths

Course over time =
Challenges + Vulnerabilities + **Strengths**

What **inner strengths would help with:**

Anxiety | Feeling hurt | Addictions

Needing to assert yourself

Some Inner Strengths

Understandings

Capabilities

Positive emotions

Attitudes

Motivations

Virtues



Positive Neuroplasticity

Learning – changing
neural structure and function –
proceeds in two stages:



**Inner strengths are grown
from experiences of them
or related factors
– activated states – that
are installed as traits.**

Repeated mental activity
entails repeated neural activity.

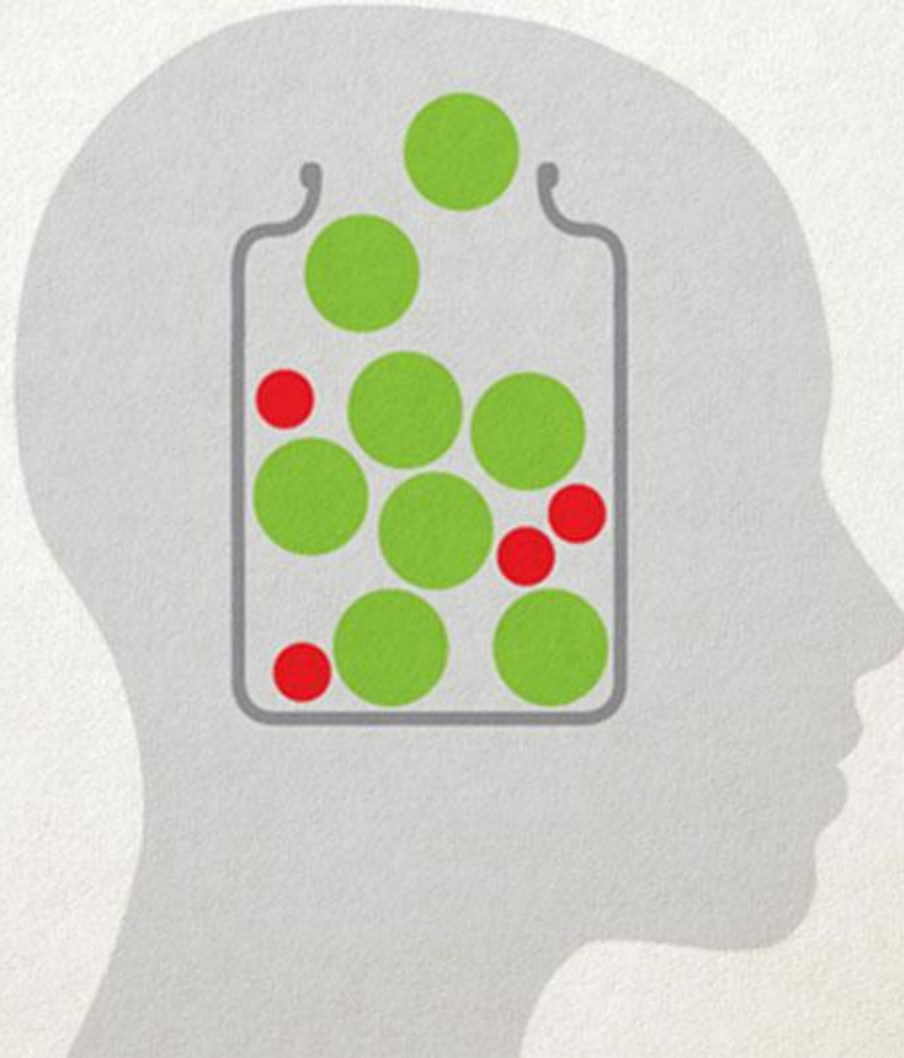
Repeated neural activity
builds neural structure.

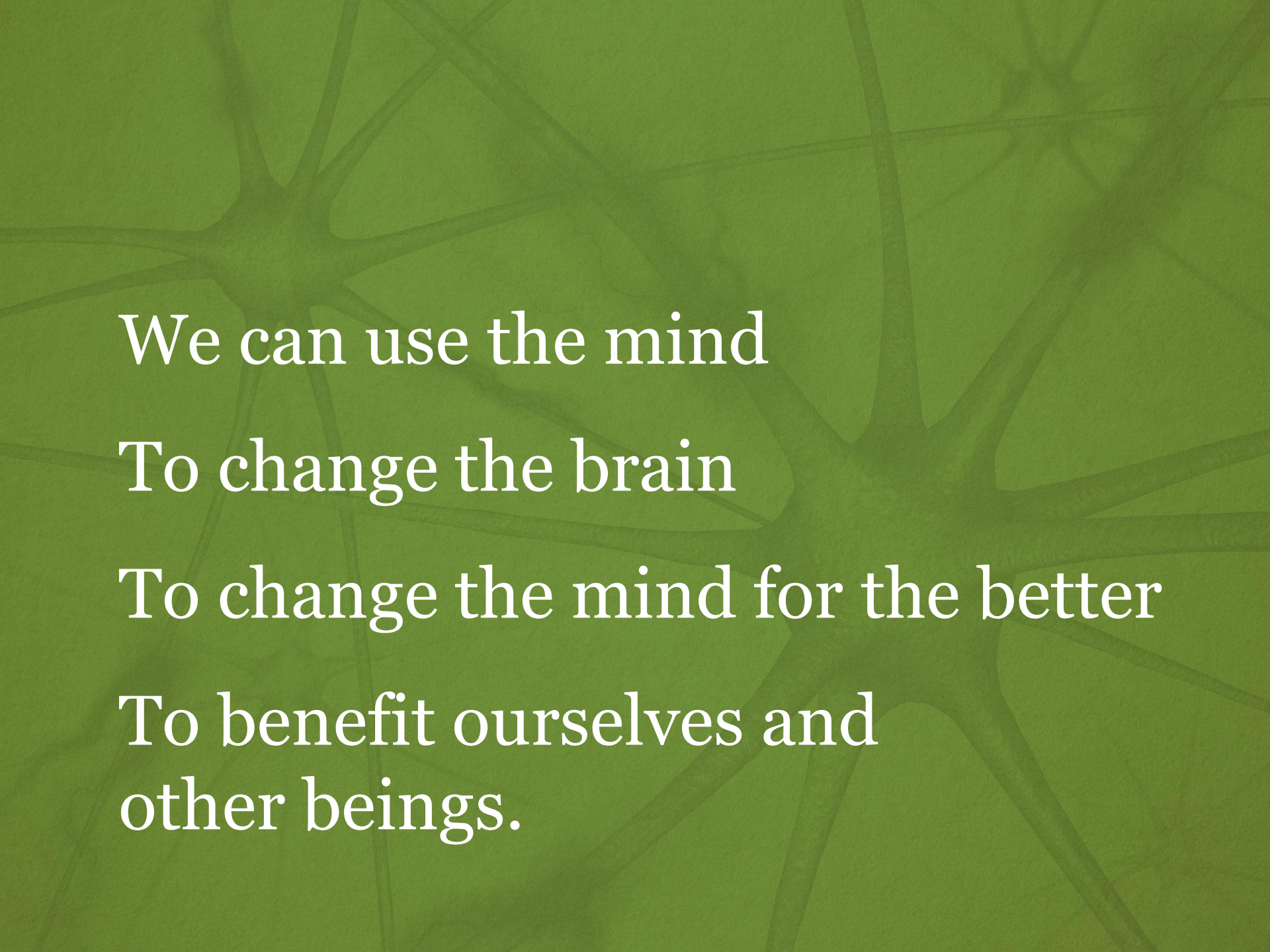


Neurons that fire together,

wire together.

Inner Strengths Are Built From Brain Structure





We can use the mind
To change the brain
To change the mind for the better
To benefit ourselves and
other beings.



Self-Directed Neuroplasticity

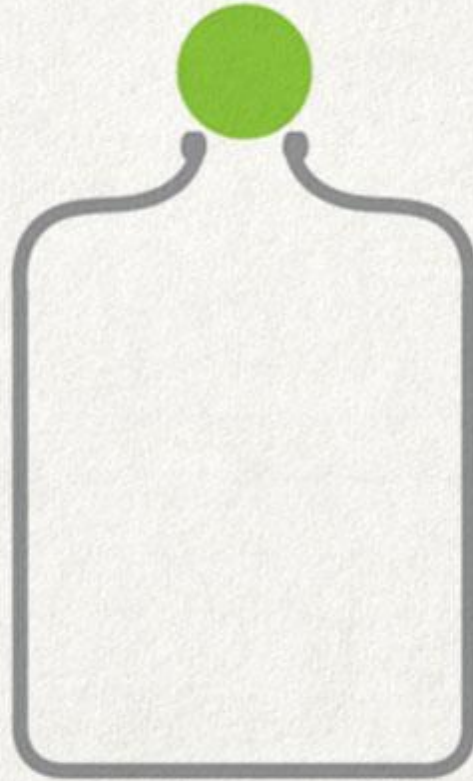
How to Take in the Good: HEAL

Activation

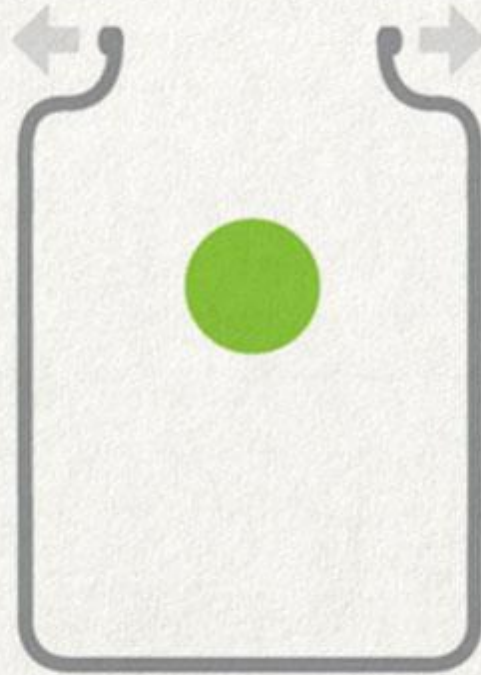
1. **Have** a beneficial experience.

Installation

2. **Enrich** it.
3. **Absorb** it.
4. **Link** positive and negative material.
(Optional)



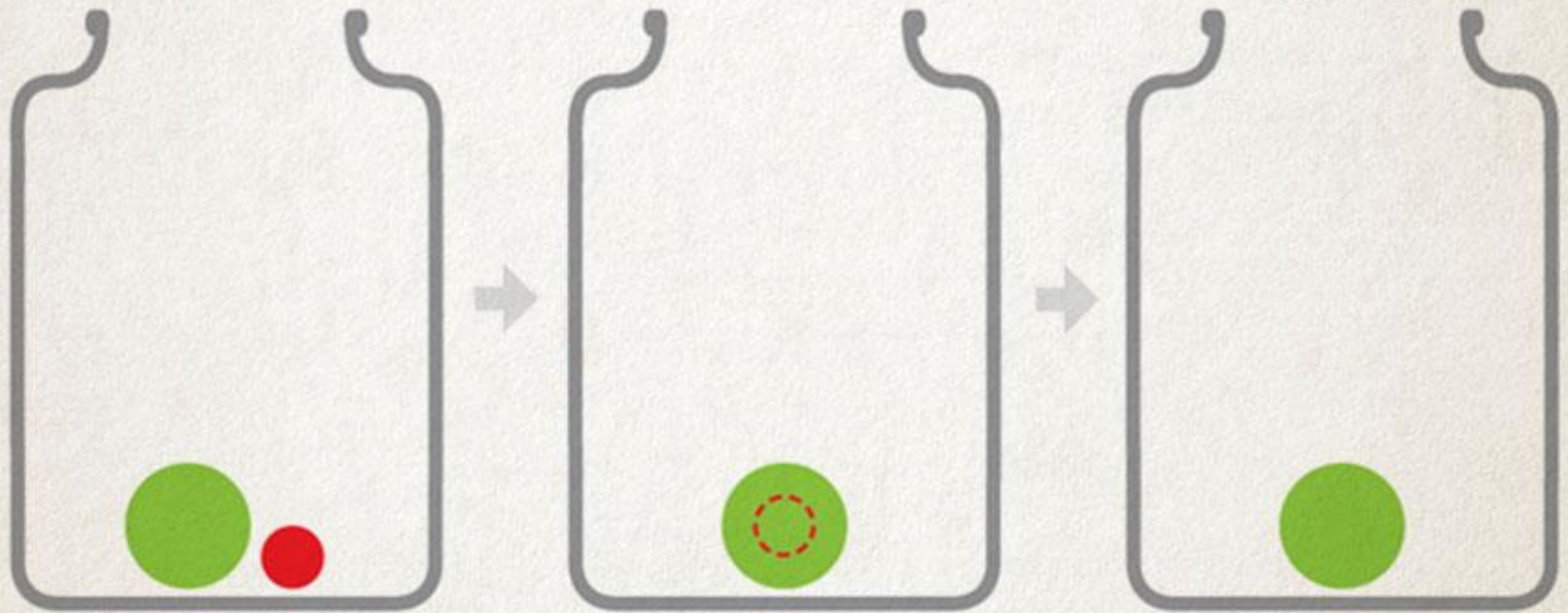
Have a Beneficial Experience



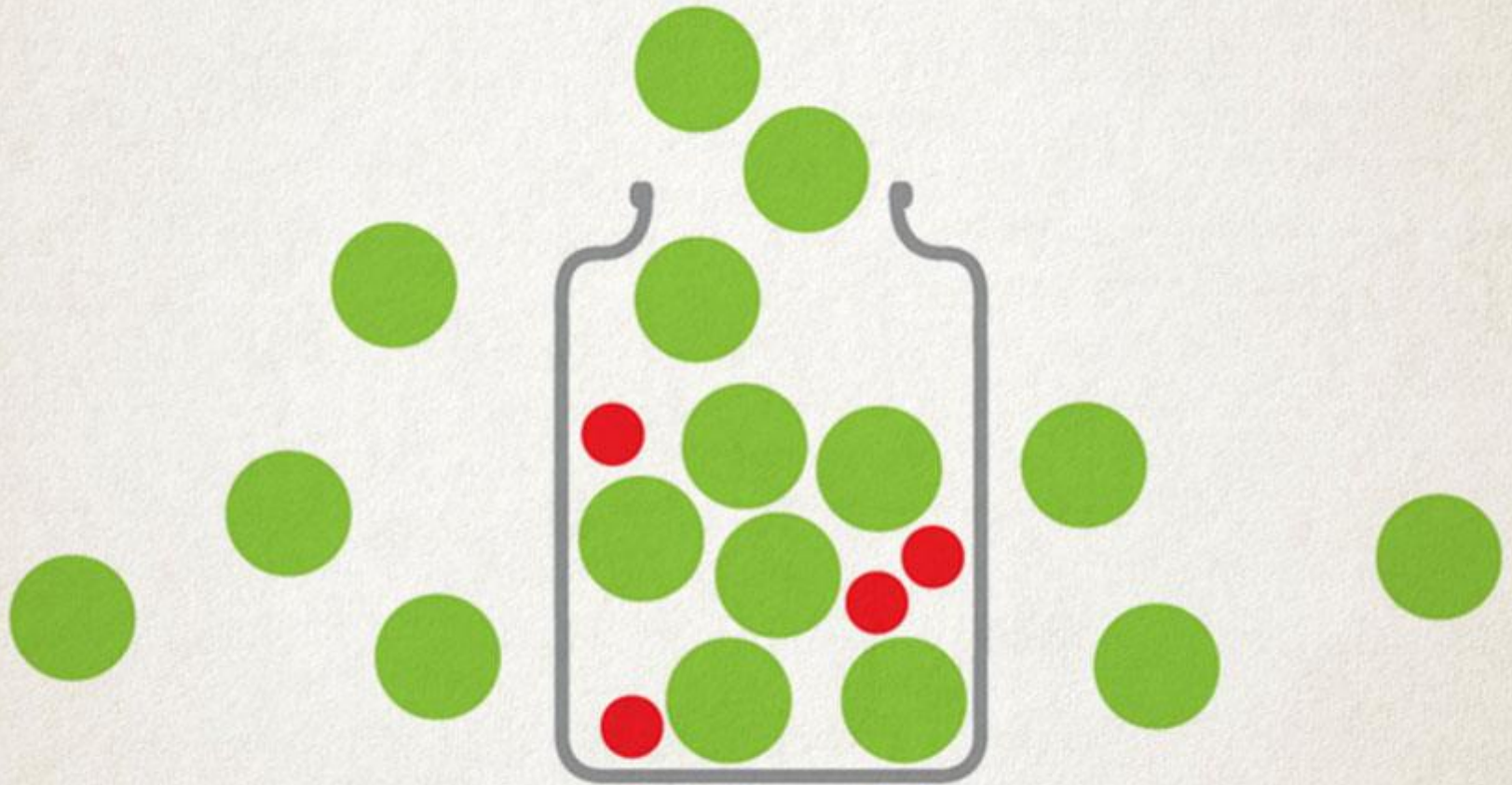
Enrich It



Absorb It



Link Positive & Negative Material



Have It, Enjoy It

Let's Practice

Centering and grounding yourself

Accepting your inner world as it is

Opening to and taking in a
growing sense of:

Peace | **Contentment** | **Love**

Reflections



Pick a partner and choose an A and a B (A's go first). Then take turns, with one person answering all of the questions here while the partner mainly listens.

TIP: If you're alone, reflect or journal.

What did you experience in that exercise?

Did you encounter any blocks to taking in the good?

Do you have any suggestions for yourself, about becoming more skillful with taking in the good?



Pick a partner and choose an A and a B (A's go first). Then take turns, with one person speaking while the partner mainly listens.

TIP: If you're alone, reflect or journal.

Imagine that you are talking with an interested friend or colleague about positive neuroplasticity, who asks you the questions on the next slide.

Take turns, each of you using about 3 minutes for each question.

Could You Tell Me . . . ?

- 1. What are three ways to engage the mind skillfully?**
- 2. Why do we need inner strengths?**
- 3. What are the two steps of all learning?**
- 4. What are some ways the brain changes when we develop inner strengths such as compassion?**
- 5. Will developing inner strengths in this way make us become attached to happy moments?**
- 6. What's this HEAL process? (4 min.)**
- 7. How have you used the HEAL process yourself?
What do you like about it?**



How was that?

What was easy to explain?

What was harder?

The Negativity Bias

Negative Experiences in Context

- Negative about negative → more negative
- Some inner strengths come only from negative experiences, e.g., “stress inoculation.”
- But negative experiences have inherent costs, in discomfort and stress.
- Could an inner strength have been developed without the costs of negative experiences?
- Many negative experiences are pain with no gain.

The Brain's Negativity Bias

As our ancestors evolved, “sticks” generally had more urgency and impact than “carrots.”

As one major feature of the brain:

1. We scan for bad news.
2. Over-focus on it, losing sight of the whole
3. Over-react to it (e.g., brain, loss aversion)
4. Install it rapidly in implicit memory
(e.g., negative interactions, learned helplessness)
5. Sensitize the brain to the negative
6. Create vicious cycles

The brain is good at
learning from bad experiences
but bad at learning from good ones.

Even though **learning
from good experiences**
is the primary way
to grow psychological resources.

The installation of beneficial experiences is worth doing in its own right.

The negativity bias adds another reason: to compensate for our over-learning from the negative.



Pick a partner and choose an A and a B (A's go first). Then take turns, with one person answering all three questions while the partner mainly listens.

TIP: If you're alone, reflect or journal.

Imagine that you are talking with a colleague:

What is the negativity bias?

What's an example of it in your own life?

What are examples of it in your clients or colleagues?



2

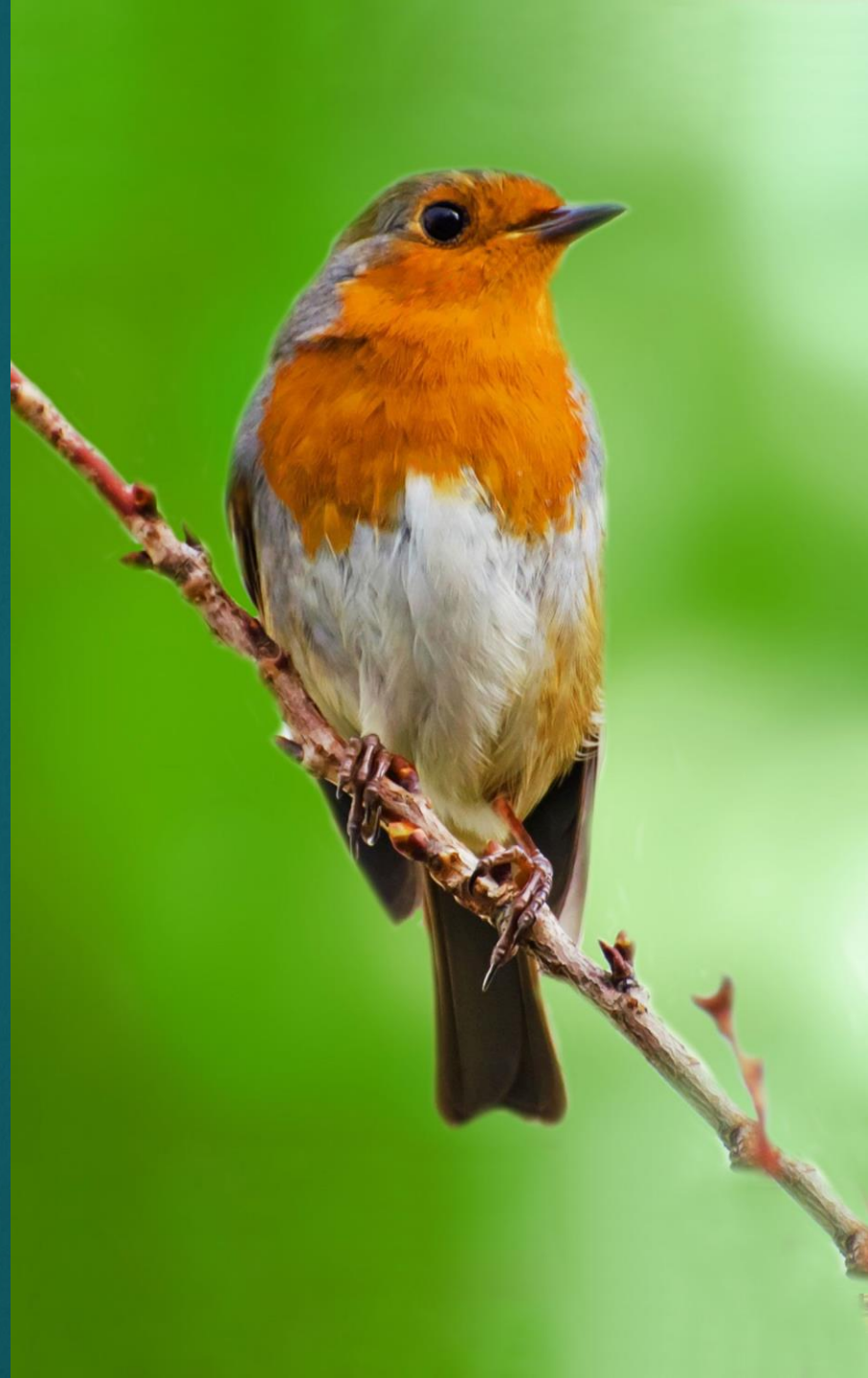
The Benefits of Growing Inner Resources

It's Good to Take in the Good

- **Development of specific inner strengths**
 - General - resilience, positive mood, feeling loved
 - “Antidote experiences” - Healing old wounds, filling the hole in the heart
- **Implicit benefits:**
 - Shows that there is still good in the world
 - Being active rather than passive
 - Treating yourself kindly, like you matter
 - Rights an unfair imbalance, given the negativity bias
 - Training of attention and executive functions
- **Sensitizes brain to positive: like Velcro for good**

”
*Keep a green bough
in your heart,
and a singing bird
will come.*

Lao Tzu



Research on the HEAL Process

- With collaborators from the University of California, a 2013 study on the HEAL course, using a randomized waitlist control group design (46 subjects).
- Course participants, compared to the control group, reported more Contentment, Self-Esteem, Savoring, Satisfaction with Life, and Gratitude.
- After the course and at two month follow-up, pooled participants also reported more Love, Compassion, Self-Compassion, Mindfulness, Self-Control, Positive Rumination, Joy, Amusement, Awe, and Happiness, and less Anxiety and Depression.

Combined Sample: Depression (BDI) & Anxiety (BAI)





Pick a partner and choose an A and a B (A's go first). Then take turns, with one person answering all three questions while the partner mainly listens.

TIP: If you're alone, reflect or journal.

Imagine that you are talking with a friend:

What are some of your inner strengths?

What inner strengths are you developing these days?

How are you developing them?

Cultivation De-fuels Craving

- It is wholesome to wish for the happiness and welfare of all beings - including yourself.
- We rest the mind upon positive states so that the brain may gradually take their shape. This disentangles us from craving as we increasingly rest in a peace, contentment, and love that is independent of external conditions.
- With time, even the practice of cultivation falls away – like a raft that is no longer needed once we reach the farther shore.

Group Discussion

What is **profound about
positive neuroplasticity?**

What Is Profound About PN? **(1)**

- **Receptive intimacy with experiencing**
- **Recognizing the beneficial in experience**
- **Recognizing good facts all around**
- **Courage to change and be changed**
- **Benevolence toward yourself**
- **Autonomy inside your own mind – especially when pushed by forces**
- **Self-reliance; don't need therapeutic authorities**

What Is Profound About PN?

(2)

- **Recognizing challenges and suffering – for which we need inner strengths**
- **Appreciating soft longing heart of others**
- **Opportunities for rapid success, positive feedback**
- **Undoing underlying causes of “craving”**
- **“Cultural disobedience”**
- **Radical receptivity while letting go**
- **Gentle mastery in experiencing**



3

Helping Others to Have
Beneficial Experiences

Using HEAL with Others

Resources for Internalization

- Intention; willing to feel good
- Identified target experience
- Openness to the experience; embodiment
- Mindfulness of the process of internalization
- Working through blocks

The Four Ways to Offer a Method

- Doing it implicitly
- Teaching it and leaving it up to the person
- Doing it explicitly with the person
- Asking the person to do it on his or her own

Using HEAL in Trainings

- Take a few minutes to explain its rationale and teach it explicitly.
- In the flow, occasionally encourage enriching and absorbing, using natural language.
- Tell people they can use HEAL outside of class to deepen internalization of what they're learning.
- Don't use HEAL when it's inappropriate (e.g., radically choiceless awareness, highly self-critical about any kind of performance).

Synergies of HEAL and Mindfulness

- Improved mindfulness enhances HEAL.
- HEAL increases factors of mindfulness (e.g., executive functions, self-compassion, determination, distress tolerance).
- HEAL heightens learning from mindfulness:
 - The sense of stable presence itself
 - Disidentifying from reactions
 - Deepening centeredness
 - Insight into nature of experience



Pick a partner and choose an A and a B (A's go first). Then take turns, with one person answering all of the questions while the partner mainly listens.

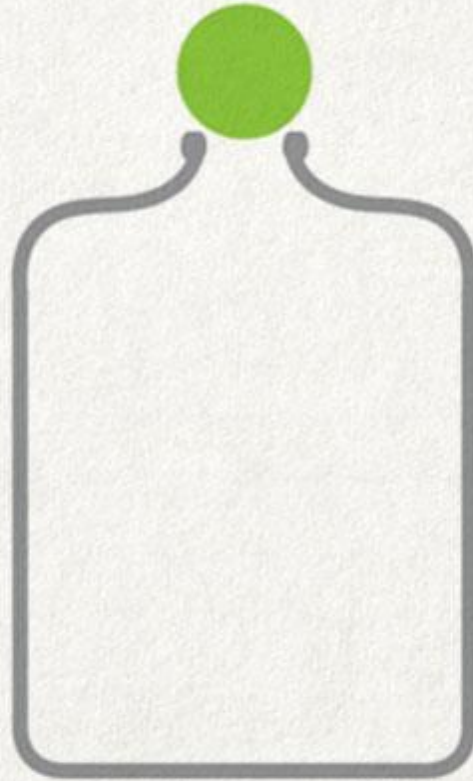
TIP: If you're alone, reflect or journal.

Imagine that you are talking with a colleague:

What could you do to foster greater resources for internalization in the people you work with?

How could you use positive neuroplasticity and the HEAL process more systematically in your work?

Skills with “Noticing”



Have a Good Experience

The Two Ways To Have a Beneficial Experience

1

Notice one you are
already having.

- In the foreground of awareness
- In the background

2

Create one.

It is remarkable that
there are always beneficial aspects
of ongoing experience.

There are always opportunities
for internalizing
beneficial experiences

Elements of Experience

Thought

belief • perspective • expectation • image • memory • idea

Perception

sensation (e.g., relaxation, vitality) • sight • sound • taste • smell

Emotion

feeling • mood

Desire

want • wish • hope • drive • motivation • purpose • dream • passion

Action

behavior • posture • knowing how to



Pick a partner and choose an A and a B. Go all the way through (~ 5 minutes) and then switch roles.

TIP: If you're alone, reflect or journal.

A's choose one or more beneficial experiences. B's, help A's identify the five aspects of experience: thoughts, perceptions, emotions, desires, and actions.

As a bonus, you can take in these aspects of experience as you identify them.

Elements of Experience

Thought

belief • perspective • expectation • image • memory • idea

Perception

sensation (e.g., relaxation, vitality) • sight • sound • taste • smell

Emotion

feeling • mood

Desire

want • wish • hope • drive • motivation • purpose • dream • passion

Action

behavior • posture • knowing how to

Skills with “Creating”

How to Create A Beneficial Experience

Look for good facts in:

1. Immediate situation
2. Current or recent events
3. Stable conditions
4. Your character
5. The past
6. The future
7. Bad situations
8. The lives of others
9. Your imagination
10. Care about others
11. Directly evoke a beneficial experience
12. Produce good facts
13. Share about good facts with others

Most of these involve
(1) recognizing good facts and
(2) having a good experience.

Both are challenging
for many people.

Turning a Good Fact Into a Good Experience

- Bring awareness to your **body**.
- Soften and **open**.
- Be a little **active** in your mind.
- Imagine how **another person** might feel.
- Be kind to yourself, and **encourage** a good experience.



Find a partner, pick A and B. Go back and forth about each type of good fact (~90 sec. each), then on to the next type:

TIP: If you're alone, reflect or journal.

- 1. Immediate situation**
- 2. Current or recent events**
- 3. Stable conditions**
- 4. One's character**
- 5. The past**
- 6. The future**
- 7. Bad situations**
- 8. The lives of others**



Helping People with Blocks

Reflection on “Blocks”

Blocks = mental factors that reduce, derail, inhibit, or defend against mental activities that would be beneficial for a person.

Blocks are not bad. They are normal, a means of coping, often a “solution” that once made sense but is now a “problem.”

① Explore the benefits, payoffs, functions, purpose of the block.
“Join with the defense.”

② Then see if there might be better ways to accomplish the same purpose.

Blocks to Any Inner Practice

- Distractibility
- Out of touch with experience
- Uncomfortable bringing attention inward
- Over-analyzing, pulling out of the experience

Blocks to Taking in the Good

- It's hard to receive, even a good experience
- Concern you'll lose your edge; fear you'll lower your guard
- Idea that feeling good is disloyal or unfair to those who suffer
- Belief you don't deserve to feel good
- Not wanting to risk disappointment
- As a woman, socialized to make others happy, not yourself
- As a man, socialized to be stoic and not care about feelings
- You've been punished for being energized or happy
- Good things in you have been dismissed
- Positive experiences associate to negative ones
- "What's the point in feeling good, bad things will still happen"
- Payoffs in not feeling good
- Not wanting to let others off the hook
- TG is craving that leads to suffering

A Demonstration

- A volunteer? Briefly: what's the block?
- Potential key points:
 - There's often poignance about the block: the pain it's been managing, how hard life has been. Sometimes the block becomes a major clinical focus.
 - Being attentive to: “you don't get it; easy for you to say; yes, but; I'm afraid to try something different”
 - Identifying the dreaded experience the block prevents; finding and installing resources to risk or cope with it
 - Identifying problematic beliefs; finding and installing new, true, and useful beliefs
 - Being matter-of-fact, normalizing



**What are your own blocks to
taking in the good?**

**What would help you with
them?**



4

Helping Others to Install
Beneficial Experiences



The Importance of Installation

Without installation there is no learning, no change in the brain.

Activation without installation
is pleasant,
but has little lasting value.

”
*The same research that
proves therapy works
shows no improvement
in outcome over the
last 30 or so years.*

Scott Miller

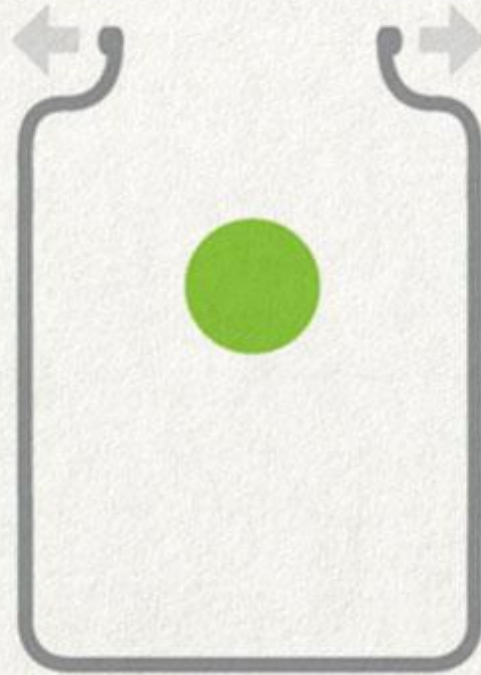


What fraction of **your own** beneficial mental states ever become neural structure?

What fraction of **your clients' or students'** beneficial mental states ever become neural structure?



Skills with Enriching



Enrich It

Factors of Enriching

- **Duration** – 5+ seconds; protecting it; keeping it going
- **Intensity** – opening to it in the mind; helping it get big
- **Multimodality** – engaging multiple aspects of experience, especially perception and emotion
- **Novelty** – seeing what is fresh; “don’t know mind”
- **Salience** – seeing why this is personally relevant

What questions do you have about:

Duration?

Intensity?

Multimodality?

Novelty?

Salience?

Skills with Absorbing



Absorb It

Two Aspects of Installation

Enriching

Mind – big, rich, protected experience

Brain – intensifying and maintaining neural activity

Absorbing

Mind – intending and sensing that the experience is received into oneself, with related rewards

Brain – priming, sensitizing, and promoting more effective encoding and consolidation

Absorbing an Experience

- Intend, sense the experience is sinking into you.
 - Imagery – Water into a sponge; golden dust sifting down; a jewel into the treasure chest of the heart
 - Sensation – Warm soothing balm
- Give over to the experience; let it change you
- Let go of resisting, grasping, clinging: “craving”



Pick a partner
and choose an
A and B.

Once finished,
find another
partner and
repeat.

TIP:

If you're alone,
reflect or journal.

(B): Tell your partner about
an important beneficial
experience for you.

(A): Take your partner
through the first three
steps of HEAL.

(B): Tell your partner
what worked well in what
they did.

Take it in! Then switch roles.

Key Resource Experiences

**We have three needs,
managed by three systems,
linked to three layers of the brain,
evolved in three stages.**

The three systems have two settings.

**One practice pulls us out of the red zone
and deepens our roots in the green zone.**

Any questions?!

Resources for Avoiding Harms

Challenge

Weakness

Helplessness

Freezing

Inflated threats

Alarm

Tension

Dread

Confusion, overwhelm

Irritation, anger

Resource

Strength

Agency

Action, venting

Accurate appraisal

Protection, calming

Relaxation

Feeling alright now

Make a plan

Big picture, peace

Resources for Approaching Rewards

Challenge

What I don't have

Scarcity

Disappointed, sad

Frustration, failure

Bored, numb

Grief

Giving up

Drivenness

Resource

What I do have

Enoughness

Gratitude, gladness

Accomplishment

Pleasure, excitement

Loved and loving

Aspire, lived by good

Already satisfied

Resources for Attaching to Others

Challenge

Left out, excluded
Inadequacy, shame
Ignored, unseen
Lonely
Resentment
Envy, jealousy
Feeling stifled

Resource

Belonging, wanted
Appreciated, respected
Receiving empathy
Friendship, caring
Recognize it hurts you
Self-compassion,
take action, good will
Skillful assertiveness

Questions for Identifying Resources

- What would have made all the difference in the world – in your childhood, first job, last relationship, etc.? (Focus on the **experience** of state or trait that would have resulted from better relationships, settings, events.)
- What does your heart still long for?
- What's happening inside you when you are in a really good place?
- What's happening in the mind of someone you know who handles your issue well?

A Demonstration

- A volunteer? Briefly: what's the issue?
- I'll focus on **resourcing**.
- Potential key points:
 - Natural process of many choices along the way
 - Getting to the challenge as it's experienced
 - Identifying key resource(s); picking one(s) that is/are accessible
 - Slowing it down; encouraging embodiment
 - Linking when it feels right



Find a new partner, pick an A and B.

TIP:

If you're alone, reflect or journal.

A's guide B's: What is an internal issue? What is a key inner strength that could help? How could you have and take in experiences of it in your life?

A's guide B's through HEA steps for this strength.

B's tell A's what worked.

Switch roles.



**What worked to identify key
inner strengths?**

**What worked in guiding the
HEA steps?**



Find a new partner, pick an A and B.

TIP:

If you're alone, reflect or journal.

A's guide B's: What is an internal issue? What is a key inner strength that could help? How could you have and take in experiences of it in your life?

A's guide B's through HEA steps for this strength.

B's tell A's what worked.

Switch roles.



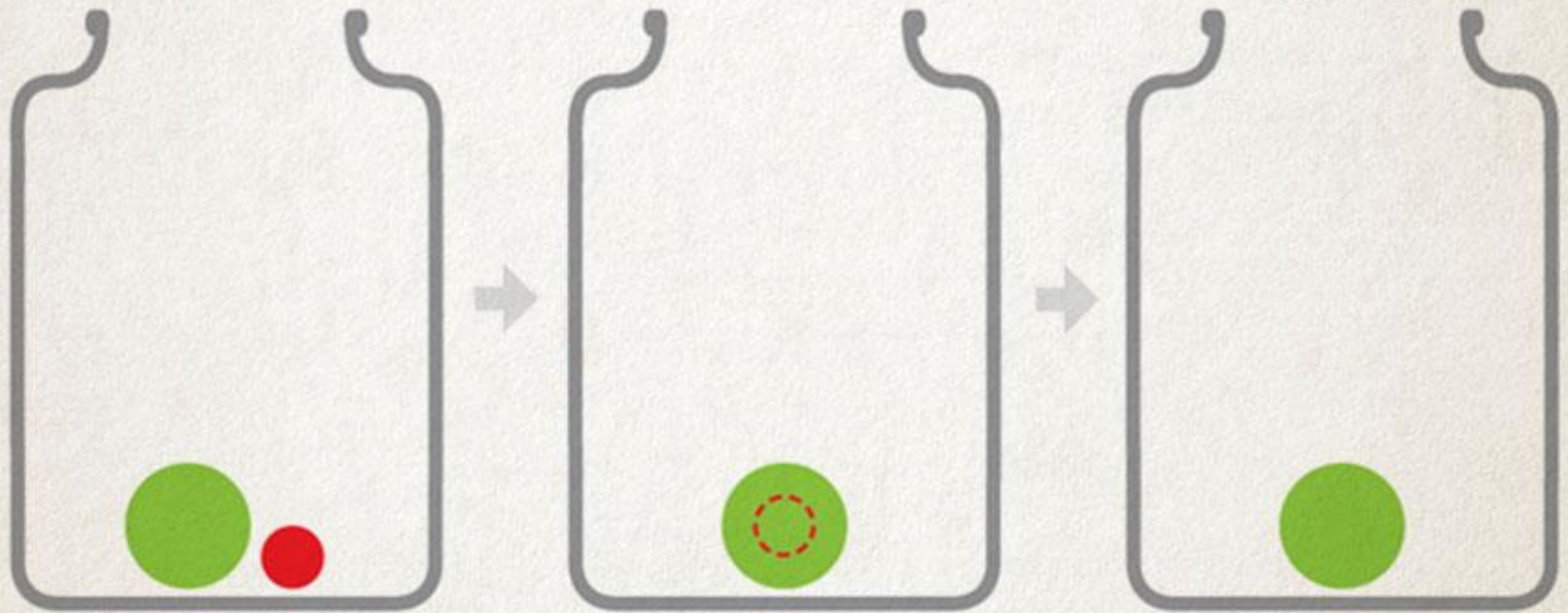
5

Using Positive Material to
Address Negative Material

Skills with “Linking”



A quick review . . .



Link Positive & Negative Material

What is “negative material?”

**Painful, harmful thoughts,
perceptions, emotions,
desires, and actions**

Foreground of awareness

Background of awareness

Unconscious

How Linking Works

- Activated negative material associates to whatever is also present in awareness.
- When negative material leaves awareness, these associations are reconsolidated in memory.
- This means that positive material can soothe, ease, put in perspective, and even replace negative material.
- Examples: pain held in spacious awareness; telling a friend about a problem; self-compassion for an upset; feeling cared about alongside feeling hurt

Conditions for the Link Step

- Divided awareness;
holding two things at once
- Not hijacked by negative;
if so, drop negative
- Positive material is more
prominent in awareness.

Degree of Engagement with Negative

- The idea of the negative material
- A felt sense of the negative material
- The positive material goes into the negative material

Throughout, the positive material remains
more prominent in awareness.

Skills with the 4th Step

- Be on your own side; you want the positive to win. Perhaps imagine inner allies with you.
- Be resourceful. It's OK to be creative, even playful.
- If the negative gets too strong, drop it; return to positive.
- Get a sense of receiving the positive into the negative.
- End with just the positive.
- Start with positive or negative material.



Role play one partner explaining to the other one: **What is Linking and how to do it?**

Find a new partner, pick an A and B.

A's set up the roles, and begin.

B's tell A's what worked. Then say what was not so clear to you.

TIP:

If you're alone, reflect or journal.

Switch roles.



Same partner.

A's guide B's explicitly through HEAL, especially Linking. Keep it real.

TIP:

If you're alone, reflect or journal.

B's briefly describe the negative (mild to moderate) material and the positive resources that could help with it.

Then A's guide B's through HEAL, emphasizing the Link step, ~ 7-8 min.

**B's say what worked.
And any suggestions.
Switch roles.**



How was that?

What went well?

What questions do you have?



Find a new partner, pick an A and B.

TIP:

If you're alone, reflect or journal.

B's briefly describe the negative (mild to moderate) material and the positive resources that could help with it.

Then A's guide B's through HEAL, emphasizing the Link step, ~ 7-8 min.

**B's say what worked.
And any suggestions.
Switch roles.**



6

Special Applications of The HEAL Process

Using HEAL in Psychotherapy

**These considerations for
therapists will be useful for
nearly anyone using HEAL
with others.**

Implicit HEAL in Therapy

- Creating space for beneficial experiences
- Drawing attention to beneficial facts
- Encouraging positive experience of beneficial fact
- Drawing attention to key aspects of an experience
- Slowing the client down; not moving on
- Modeling taking in the good oneself

Explicit HEAL in Therapy (1)

Teach the method

- Background helps about brain, negativity bias
- Emphasize facts and mild beneficial experiences.
- Surface blocks and work through them.
- Explain the idea of “risking the dreaded experience,” noticing the (usually) good results, and taking them in.

Explicit HEAL in Therapy (2)

- Do HEAL with client(s) during a session
 - Reinforcing key resource states and traits
 - Linking rewards to desired thoughts or actions
 - When learning from therapy has worked well
 - When realistic views of self and world come true
 - Good qualities in client
 - New insights
- Encourage HEAL between sessions
 - Naming occasions
 - Identifying key beneficial facts and experiences

Promoting Client Motivation

- During therapy and between sessions, HEAL:
 - Key resource experiences
 - When learning from therapy works well
 - When realistic views of you, the world, etc. come true
 - Good qualities in yourself
 - New insights
- Can be formalized in daily reflections, journaling

HEAL and Trauma

- **General considerations:**
 - People vary in their resources and their traumas.
 - Often the major action is with “failed protectors.”
 - Respect “yellow lights” and the client’s pace.
- The first three steps of HEAL are generally safe. Use them to build resources for tackling the trauma directly.
- Use the Link step to address peripheral features and themes of the trauma.
- With care, use Link to get at the heart of the trauma.

In Couples, Benefits of HEAL

- “Installs” key resources that support interactions (e.g., self-soothing, recognition of good intentions)
- Dampens vicious cycles
- Helps partner feel seen, credited for efforts
- Increases the sense of the good that is present
- Reduces clinginess, pursuing, or reproach that the other person withdraws from

Using HEAL with a Couple

- Basic steps (often informal):
 - Attention to a good fact
 - Evoking and sustaining a good experience
 - Managing blocks
 - Awareness of the impact on one's partner
 - Debriefing, often from both partners
- Pitfalls to avoid:
 - Seeming to side with one person
 - Unwittingly helping a person overlook real issues
 - Letting the other partner pile on



Pick a partner, choose
A and B (A's go first).

TIP: If you're alone,
reflect or journal.

**Take turns
talking about
using HEAL
with 2-3
different adults.**

Using HEAL with Children

Uses for Children

- Registering curricular skills and other resources
- Motivation for learning; associating rewards
- Seeing the good in the world, others, and oneself – and in the past, present, and future
- Seeing life as opportunity
- Feeling like an active learner
- Developing child-specific inner strengths

Adaptations for Children

- Kids gain from HEAL – particularly mistreated, anxious, spirited/ ADHD, or LD children.
- Style:
 - Be matter of fact: this is mental/neural literacy.
 - A little brain talk goes a long way.
 - Be motivating: name benefits; “be the boss of your own mind.”
 - Down to earth, naturalistic
 - Scaffold based on executive functions, motivation, and need for autonomy.
 - Brief, concrete

Occasions for HEAL with Kids

- Explicit training in positive neuroplasticity
- Natural rhythms in the day (e.g., start of class, after a lesson or recess, end of day)
- When working with an individual child
- When dealing with classroom issues



Pick a partner and
choose A and B
(A's go first).

TIP: If you're alone,
reflect or journal.

**Take turns
talking about
using HEAL
with children.**

*If HEAL with kids is
not relevant for you,
just talk about how
you could use it with
adults.*

Wrapping Up



Pick a partner, choose
A and B (A's go first).

When it's your turn,
answer both questions.

TIP: If you're alone,
reflect or journal.

**What did you get
out of this
training,
personally?**

**What are some
ways you hope to
apply what you've
learned here?**

Societal Implications of Positive Neuroplasticity

- For most of the time our human and hominid ancestors have lived, it was not possible to meet the core needs of everyone. But now the resources and know-how exist to do this. How we handle this unprecedented opportunity will be the central theme of this century.
- Improving external conditions is vital – but not enough. Many affluent people dwell in anxiety and anger, frustration and drivenness, and hurt and ill will.
- Repeatedly internalizing Responsive experiences develops a “green brain” that is harder to manipulate with threats and fear, greed and consumerism, and “us” vs. “them” rivalries. A critical mass of “green brains” will bring a tipping point that changes the course of human history.

Coming Home

Peace

Contentment

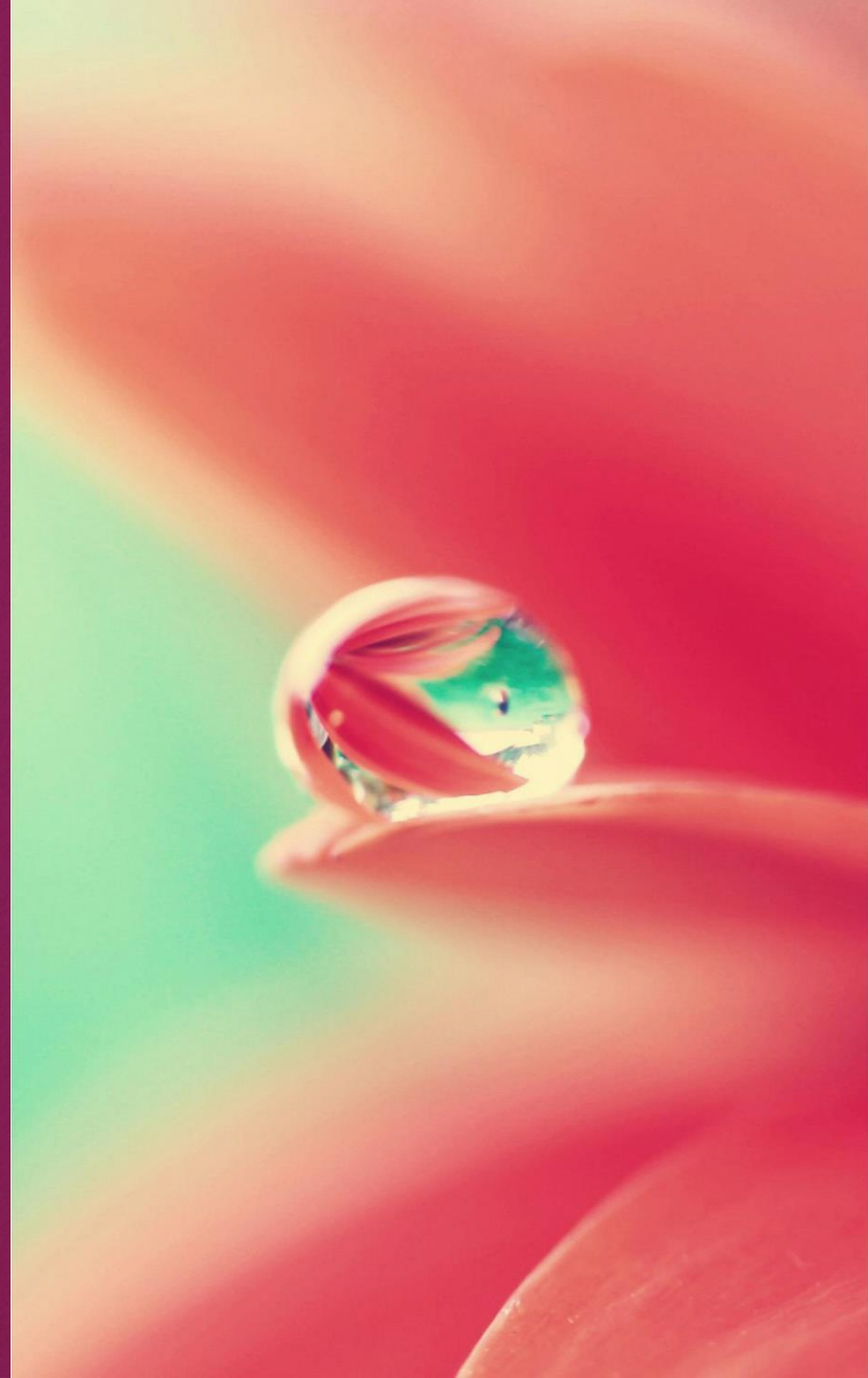
Love

*Think not lightly of good,
saying,
“It will not come to me.”*

*Drop by drop is
the water pot filled.*

*Likewise, the wise one,
Gathering it little by little,
Fills oneself with good.*

Dhammapada 9.122



Suggested Books

See RickHanson.net for other great books.

- Austin, J. 2009. *Selfless Insight*. MIT Press.
- Begley, S. 2007. *Train Your Mind, Change Your Brain*. Ballantine.
- Carter, C. 2010. *Raising Happiness*. Ballantine.
- Hanson, R. (with R. Mendius). 2009. *Buddha 's Brain: The Practical Neuroscience of Happiness, Love, and Wisdom*. New Harbinger.
- Johnson, S. 2005. *Mind Wide Open*. Scribner.
- Keltner, D. 2009. *Born to Be Good*. Norton.
- Kornfield, J. 2009. *The Wise Heart*. Bantam.
- LeDoux, J. 2003. *Synaptic Self*. Penguin.
- Linden, D. 2008. *The Accidental Mind*. Belknap.
- Sapolsky, R. 2004. *Why Zebras Don 't Get Ulcers*. Holt.
- Siegel, D. 2007. *The Mindful Brain*. Norton.
- Thompson, E. 2007. *Mind in Life*. Belknap.

Key Papers – 1

See RickHanson.net for other scientific papers.

- Atmanspacher, H. & Graben, P. 2007. Contextual emergence of mental states from neurodynamics. *Chaos & Complexity Letters*, 2:151-168.
- Baumeister, R., Bratlavsky, E., Finkenauer, C. & Vohs, K. 2001. Bad is stronger than good. *Review of General Psychology*, 5:323-370.
- Braver, T. & Cohen, J. 2000. On the control of control: The role of dopamine in regulating prefrontal function and working memory; in *Control of Cognitive Processes: Attention and Performance XVIII*. Monsel, S. & Driver, J. (eds.). MIT Press.
- Carter, O.L., Callistemon, C., Ungerer, Y., Liu, G.B., & Pettigrew, J.D. 2005. Meditation skills of Buddhist monks yield clues to brain's regulation of attention. *Current Biology*. 15:412-413.

Key Papers – 2

- Davidson, R.J. 2004. Well-being and affective style: neural substrates and biobehavioural correlates. *Philosophical Transactions of the Royal Society*. 359:1395-1411.
- Farb, N.A.S., Segal, Z.V., Mayberg, H., Bean, J., McKeon, D., Fatima, Z., and Anderson, A.K. 2007. Attending to the present: Mindfulness meditation reveals distinct neural modes of self-reflection. *SCAN*, 2, 313-322.
- Gillihan, S.J. & Farah, M.J. 2005. Is self special? A critical review of evidence from experimental psychology and cognitive neuroscience. *Psychological Bulletin*, 131:76-97.
- Hagmann, P., Cammoun, L., Gigandet, X., Meuli, R., Honey, C.J., Wedeen, V.J., & Sporns, O. 2008. Mapping the structural core of human cerebral cortex. *PLoS Biology*. 6:1479-1493.
- Hanson, R. 2008. Seven facts about the brain that incline the mind to joy. In *Measuring the immeasurable: The scientific case for spirituality*. Sounds True.

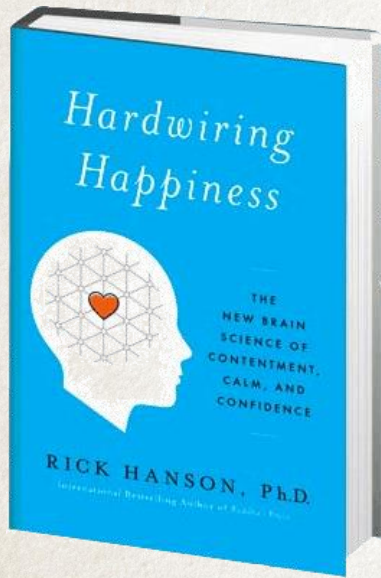
Key Papers – 3

- Lazar, S., Kerr, C., Wasserman, R., Gray, J., Greve, D., Treadway, M., McGarvey, M., Quinn, B., Dusek, J., Benson, H., Rauch, S., Moore, C., & Fischl, B. 2005. Meditation experience is associated with increased cortical thickness. *Neuroreport*. 16:1893-1897.
- Lewis, M.D. & Todd, R.M. 2007. The self-regulating brain: Cortical-subcortical feedback and the development of intelligent action. *Cognitive Development*, 22:406-430.
- Lieberman, M.D. & Eisenberger, N.I. 2009. Pains and pleasures of social life. *Science*. 323:890-891.
- Lutz, A., Greischar, L., Rawlings, N., Ricard, M. and Davidson, R. 2004. Long-term meditators self-induce high-amplitude gamma synchrony during mental practice. *PNAS*. 101:16369-16373.
- Lutz, A., Slager, H.A., Dunne, J.D., & Davidson, R. J. 2008. Attention regulation and monitoring in meditation. *Trends in Cognitive Sciences*. 12:163-169.

Key Papers – 4

- Rozin, P. & Royzman, E.B. 2001. Negativity bias, negativity dominance, and contagion. *Personality and Social Psychology Review*, 5:296-320.
- Takahashi, H., Kato, M., Matsuura, M., Mobbs, D., Suhara, T., & Okubo, Y. 2009. When your gain is my pain and your pain is my gain: Neural correlates of envy and schadenfreude. *Science*, 323:937-939.
- Tang, Y.-Y., Ma, Y., Wang, J., Fan, Y., Feng, S., Lu, Q., Yu, Q., Sui, D., Rothbart, M.K., Fan, M., & Posner, M. 2007. Short-term meditation training improves attention and self-regulation. *PNAS*, 104:17152-17156.
- Thompson, E. & Varela F.J. 2001. Radical embodiment: Neural dynamics and consciousness. *Trends in Cognitive Sciences*, 5:418-425.
- Walsh, R. & Shapiro, S. L. 2006. The meeting of meditative disciplines and Western psychology: A mutually enriching dialogue. *American Psychologist*, 61:227-239.

Where to Find Rick Hanson Online



Hardwiring Happiness: The New Brain Science of Contentment, Calm, and Confidence

www.rickhanson.net/hardwiringhappiness

Personal website: [**www.rickhanson.net**](http://www.rickhanson.net)

Wellspring Institute: [**www.wisebrain.org**](http://www.wisebrain.org)



youtube.com/drrhanson



facebook.com/rickhansonphd

Experience-Dependent Neuroplasticity

[background]



First, respect for mystery.

*The brain is wider
than the sky,*

*For, put them
side by side,*

*The one the other
will include*

*With ease, and
you beside.*

Emily Dickinson



*We ask,
“What is a thought?”*

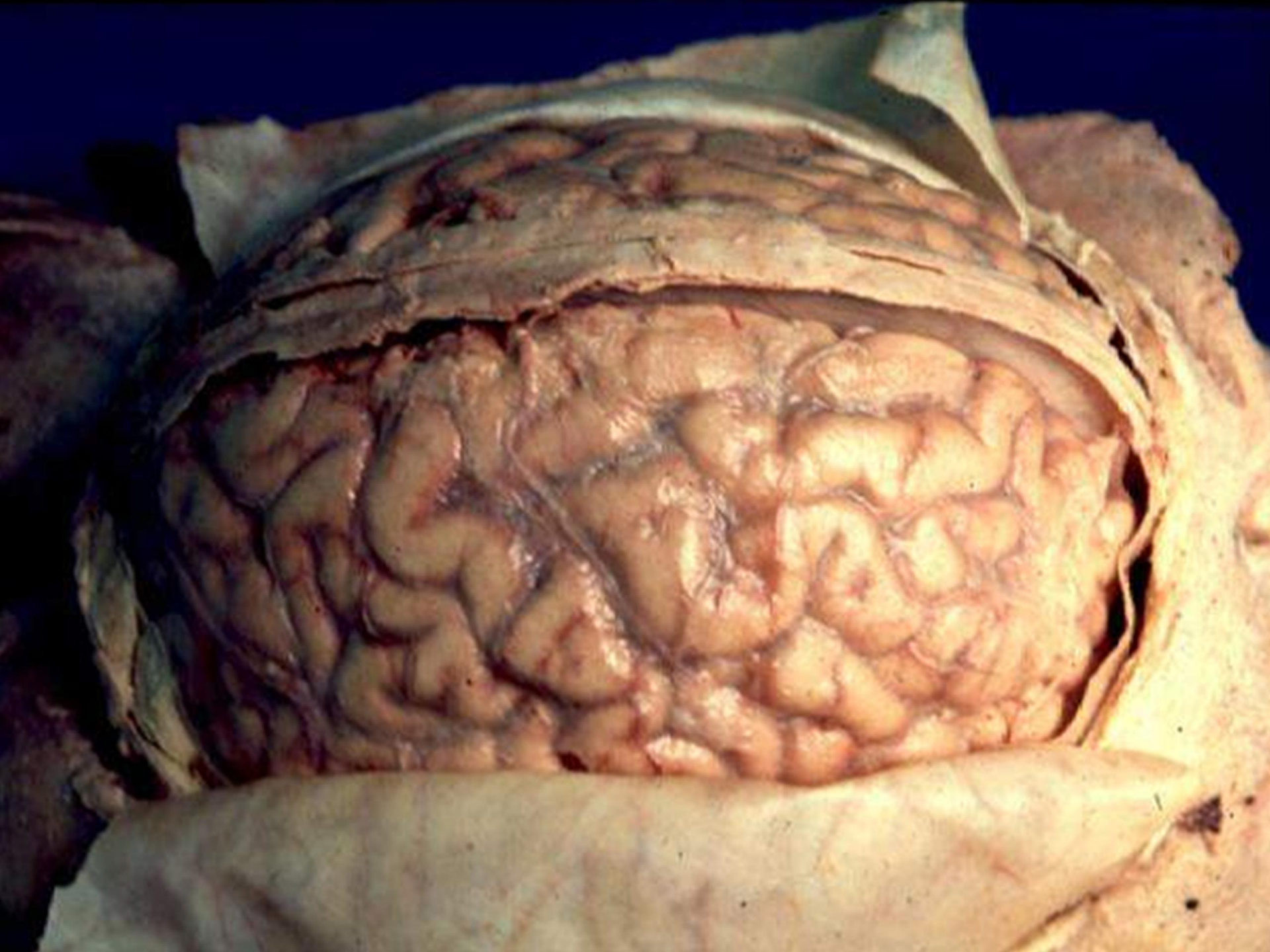
*We don't know,
yet we are thinking
continually.*

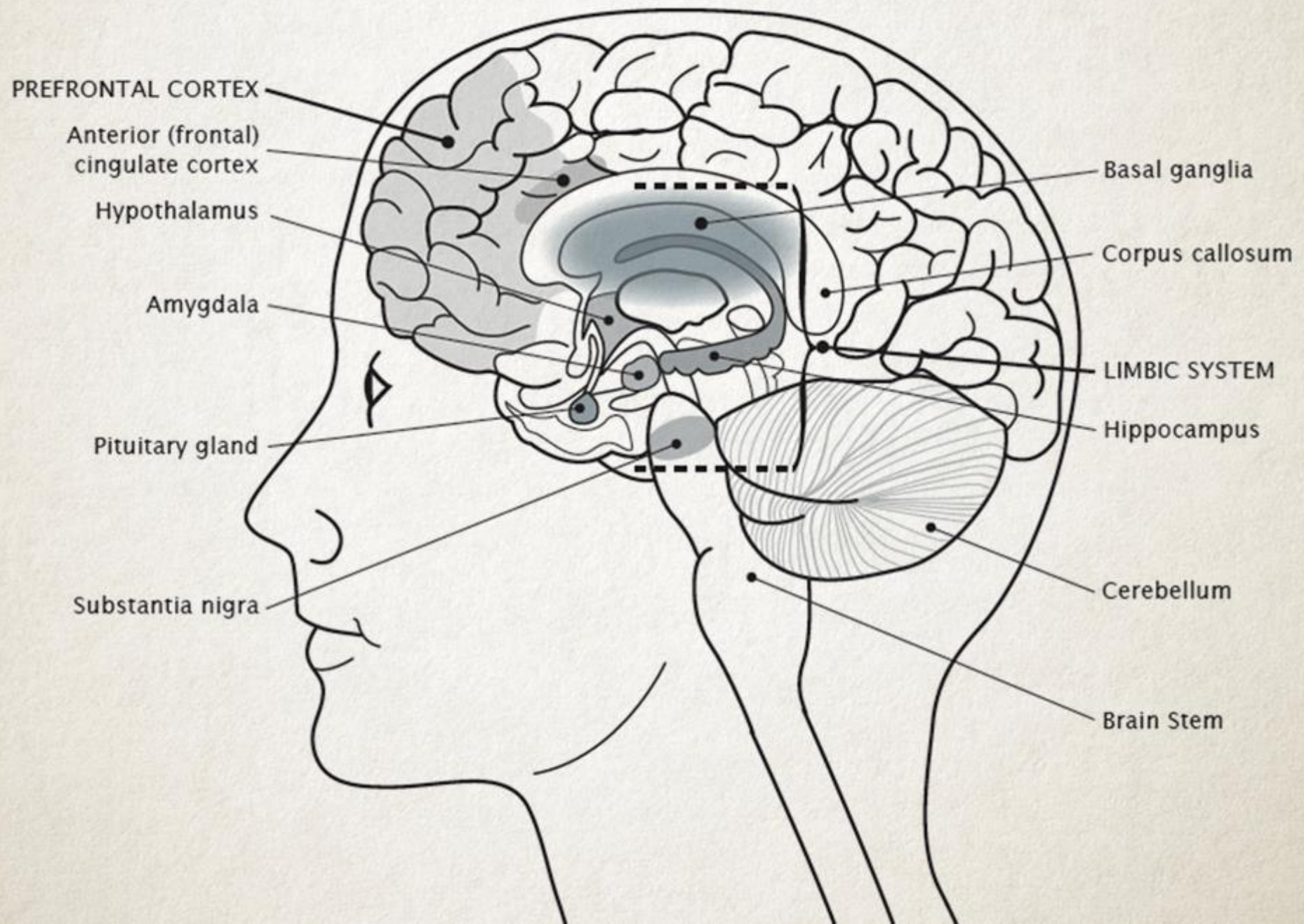
Venerable Tenzin Palmo





Second, the hardware.





Your Brain: The Technical Specs

Size:

- 3 pounds of tofu-like tissue
- 1.1 trillion brain cells
- 85 billion “gray matter” neurons

Activity:

- Always on 24/7/365 - Instant access to information on demand
- 20-25% of blood flow, oxygen, and glucose

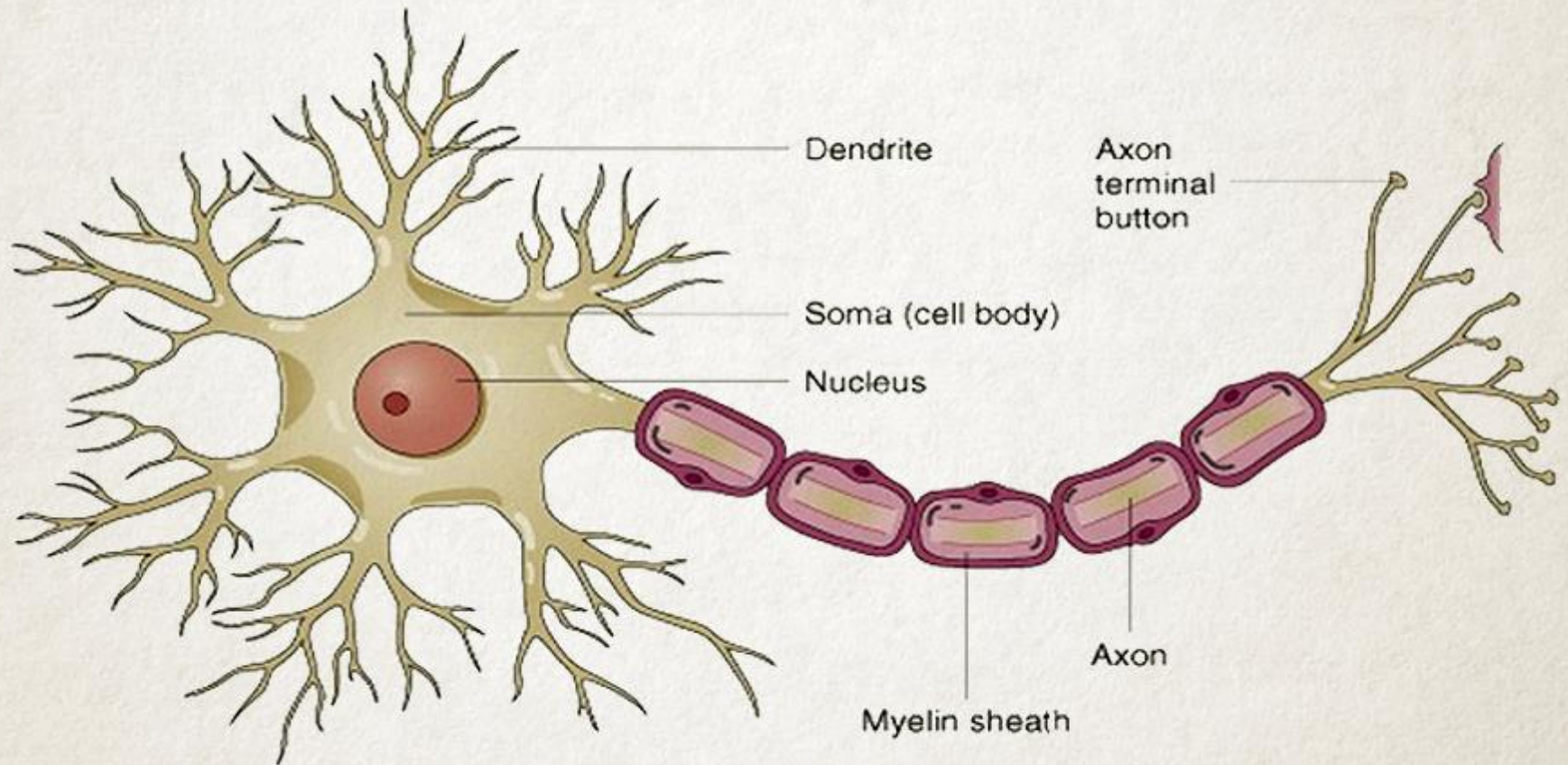
Speed:

- Neurons firing around 5 to 50 times a second (or faster)
- Signals crossing your brain in a tenth of a second

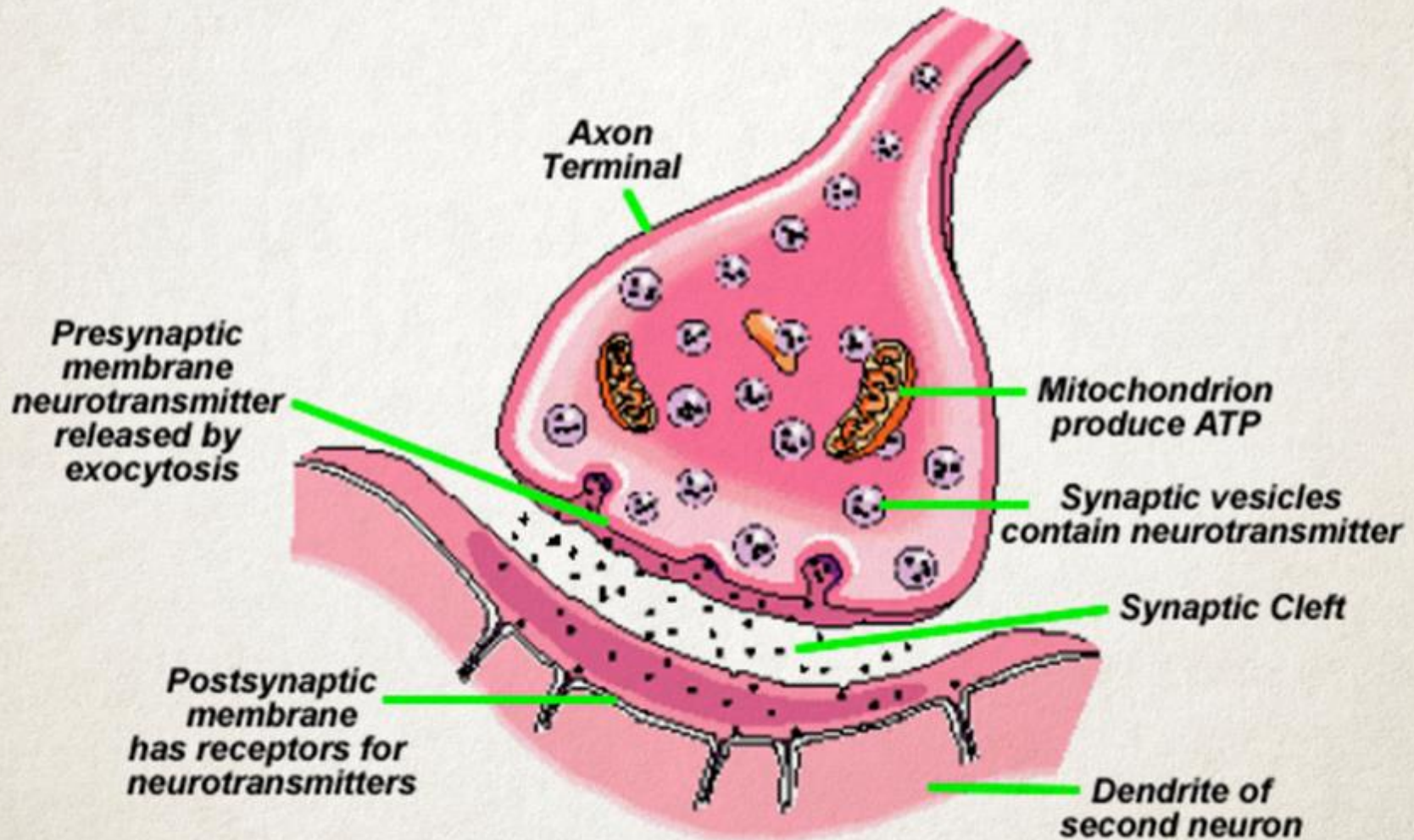
Connectivity:

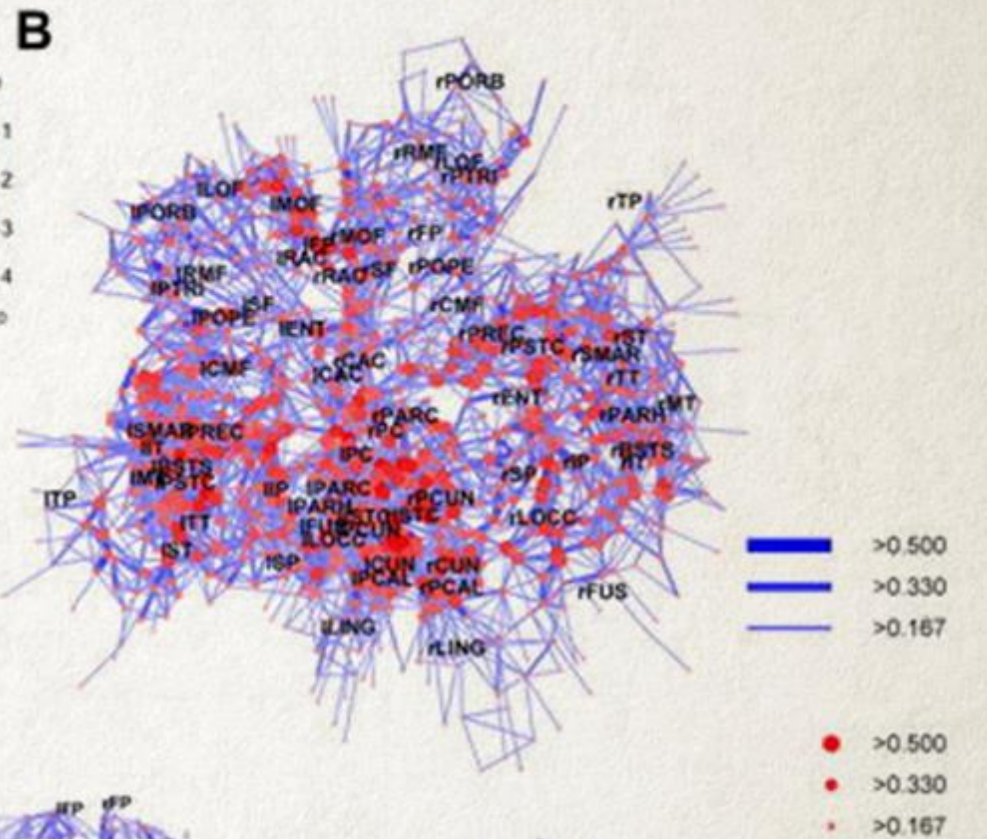
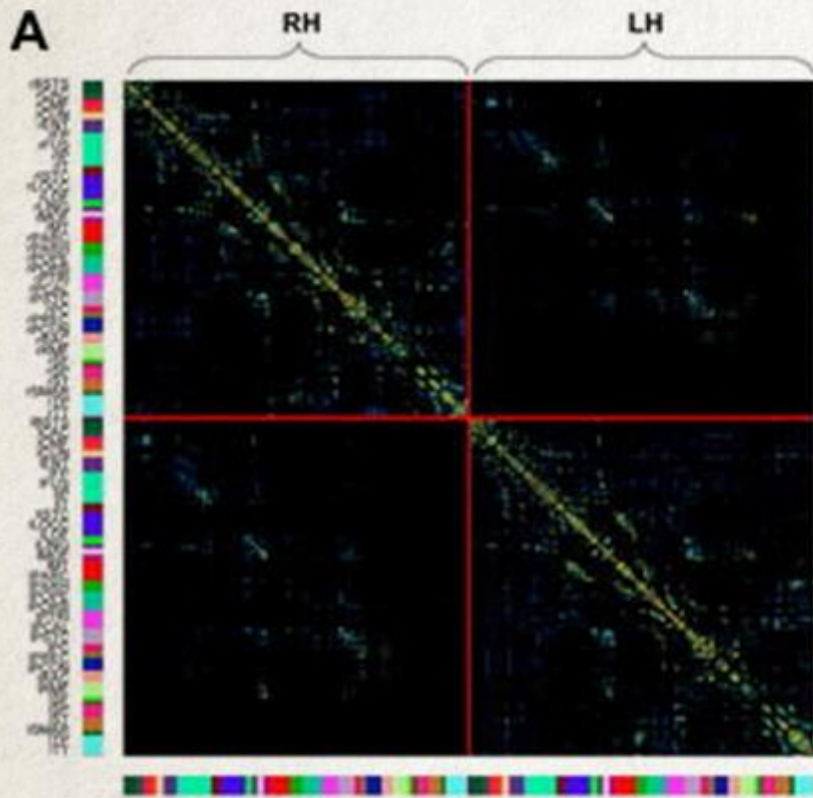
- Average neuron makes ~ 5000 connections with other neurons:
~ 500 trillion synapses

A Neuron



A Synapse





The background of the slide is a solid green color with a faint, darker green pattern of neurons. The neurons are depicted with central cell bodies and multiple branching processes extending outwards, creating a network-like structure.

Third, the mind.

What's the purpose of all this hardware?





All cells have specialized functions. Brain cells have particular ways of processing information and communicating with each other. Nerve cells form complete circuits that carry and transform information.

Electrical signaling represents the language of mind, the means whereby nerve cells, the building blocks of the brain, communicate with one another over great distances. Nerve cells generate electricity as a means of producing messages.

All animals have some form of mental life that reflects the architecture of their nervous system.

Eric R. Kandel

The Natural Mind

Apart from the hypothetical influence of a transcendental X factor . . .

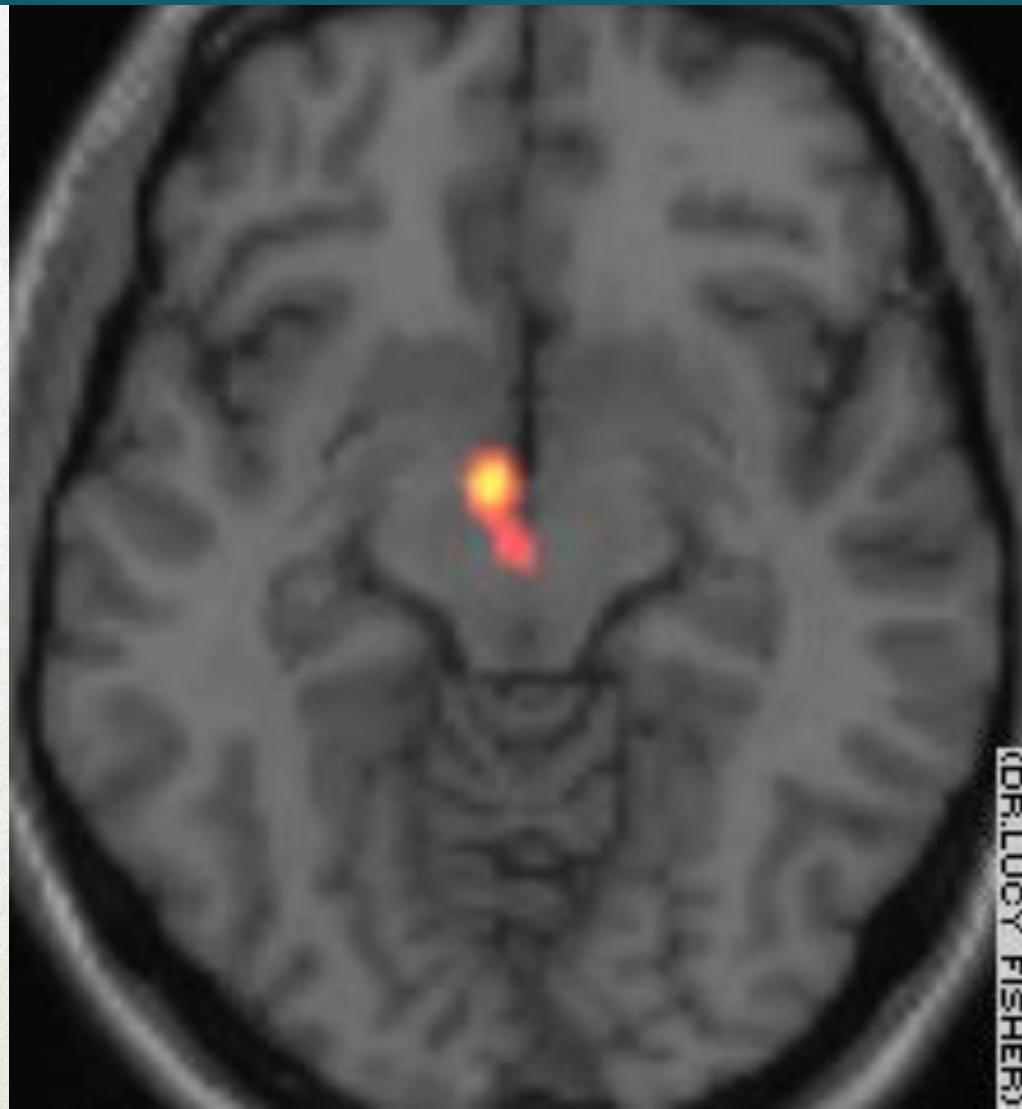
Awareness and unconsciousness, mindfulness and delusion, and happiness and suffering must be **natural** processes.

Mind is grounded in life.

The background of the slide features a dark green color with a faint, stylized pattern of neurons. The neurons are depicted with central cell bodies and multiple branching processes extending outwards, creating a network-like structure across the entire frame.

Mental activity entails
underlying **neural activity**.

Rewards of Love



Lazar, et al. 2005.

**Meditation
experience is
associated
with increased
cortical
thickness.**

Neuroreport, 16,
1893-1897.

