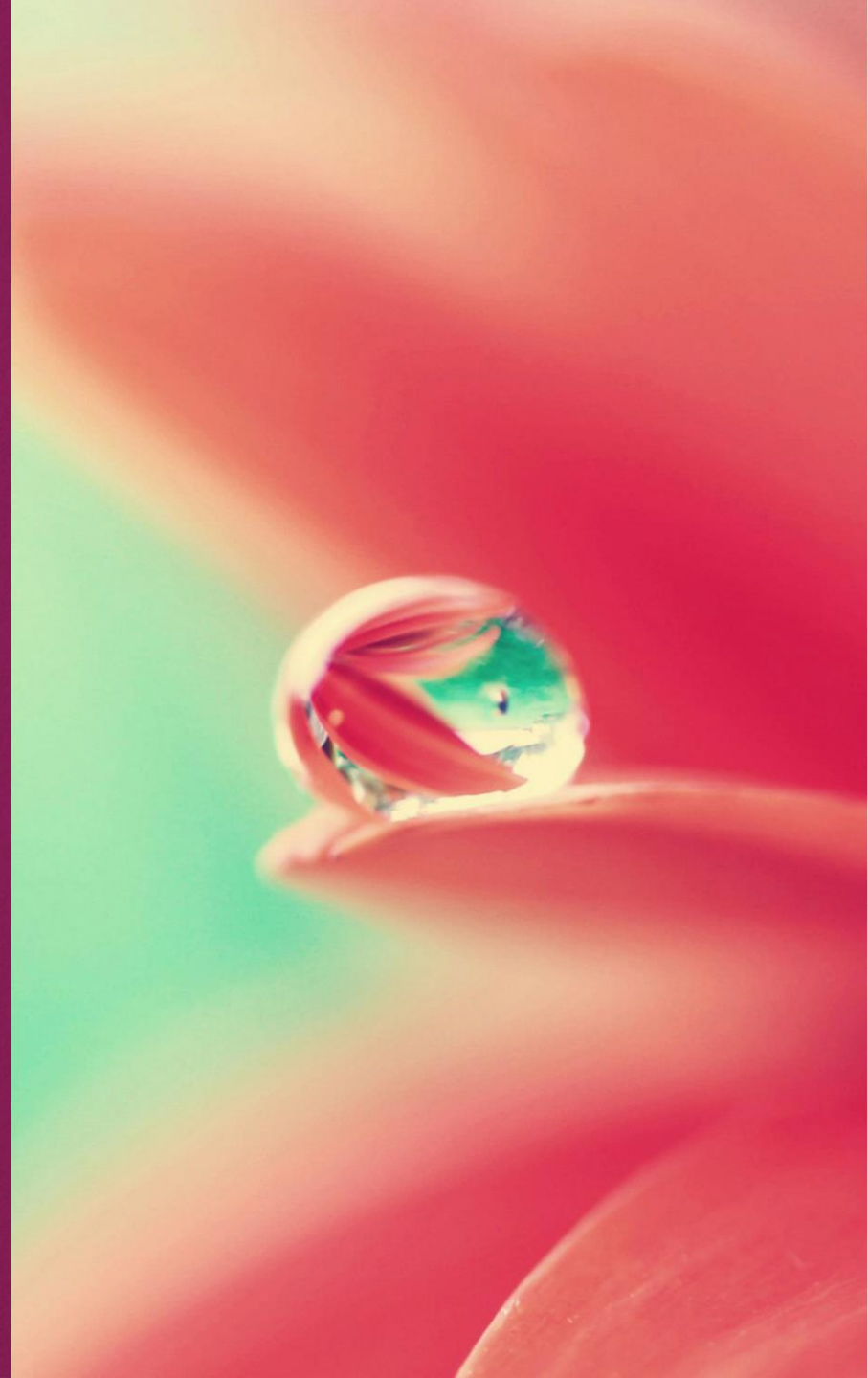


*Think not lightly of good,
saying,
“It will not come to me.”*

*Drop by drop is
the water pot filled.*

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

Dhammapada 9.122



Positive Neuroplasticity Training



Turning Everyday Experiences
Into Lasting Inner Strengths

© Rick Hanson, Ph.D., 2016



1

The Essence of Positive Neuroplasticity



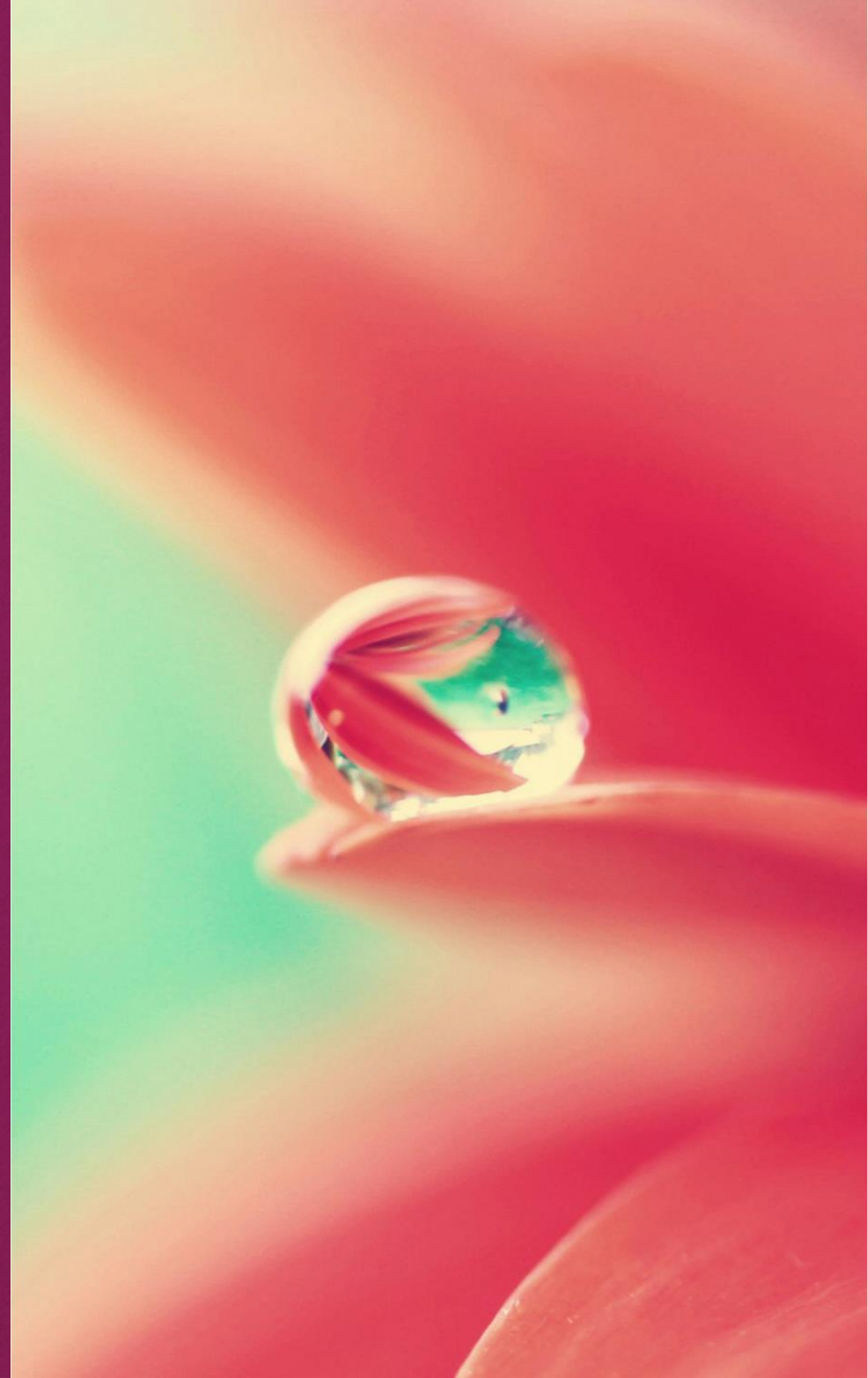
Introduction

*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



Classes of PNT

1

The **Essence**
of Positive
Neuroplasticity

2

Having, Enriching,
and Absorbing
Experiences

3

Linking Positive
And Negative
Material

4

Growing
Strengths for
Safety

5

Growing
Strengths for
Satisfaction

6

Growing
Strengths for
Connection

What We're Doing in PNT

1

Learning how
to deliberately
internalize
beneficial
experiences
in implicit
memory

2

Using
internalization
skills to
cultivate what
would be
beneficial in
your mind

3

Exploring
different ways
to encourage
beneficial
states and
traits



MOST IMPORTANT



Challenges & Resources



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, exploring these questions:

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

What are some of the challenges in your life these days? (in the world, body, or mind)

What mental resources do – or could – help you with these challenges?

A Taste of Taking in the Good

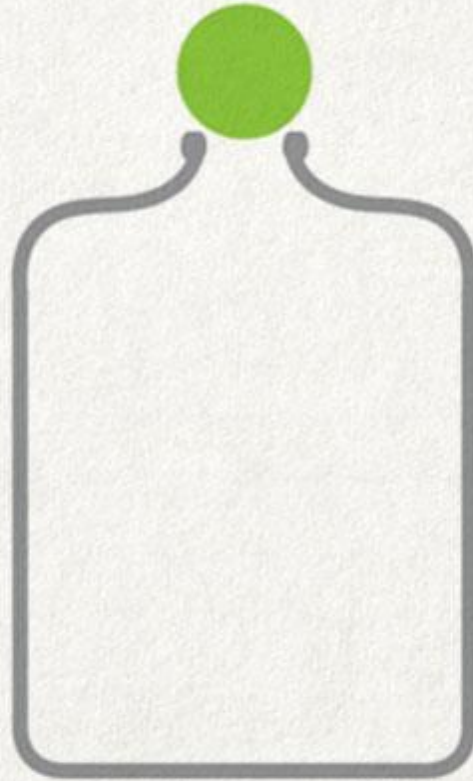
How to Take in the Good: HEAL

Activation

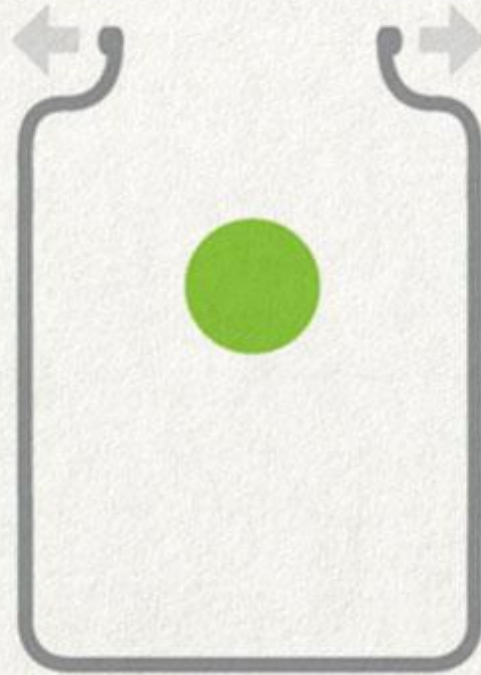
1. **Have** a beneficial experience

Installation

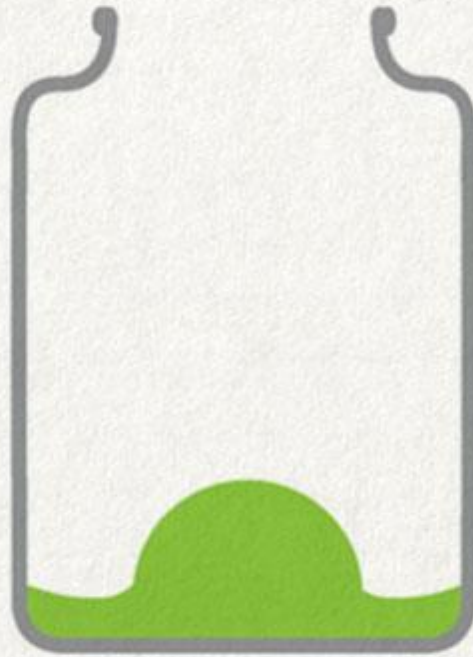
2. **Enrich** the experience
3. **Absorb** the experience
4. **Link** positive and negative material
(Optional)



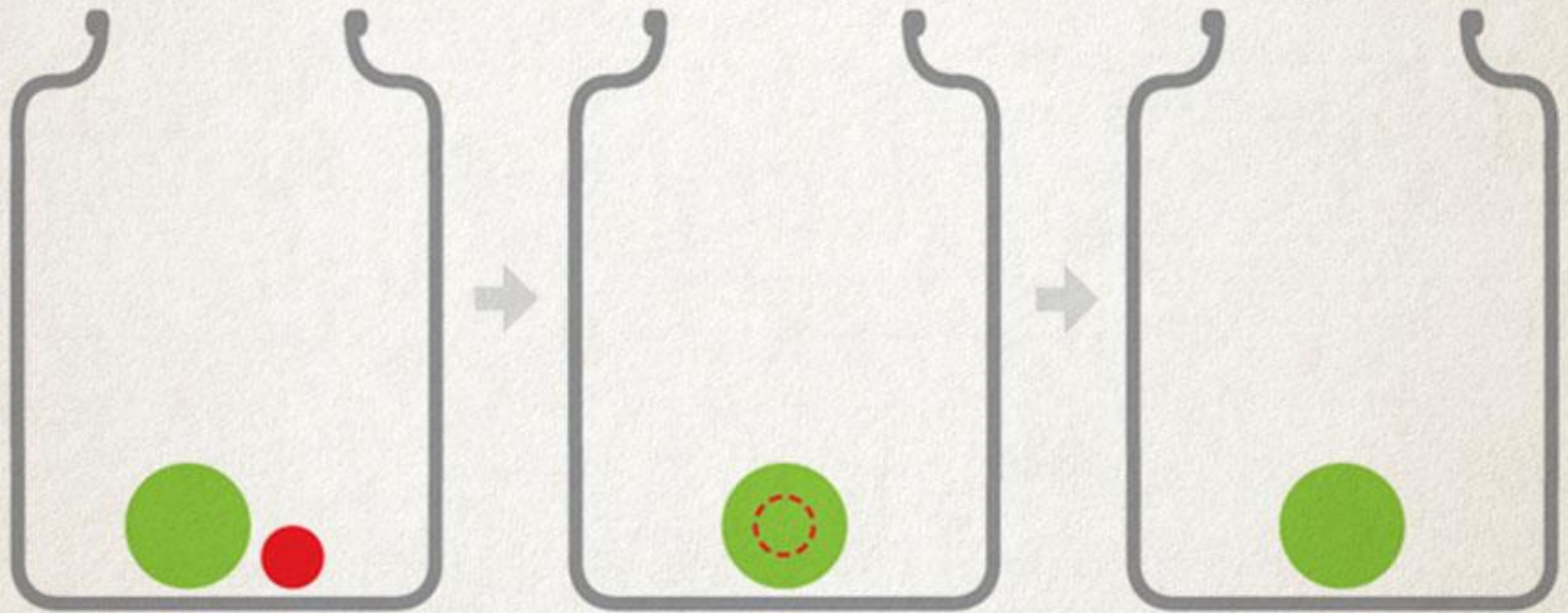
Have a Beneficial Experience



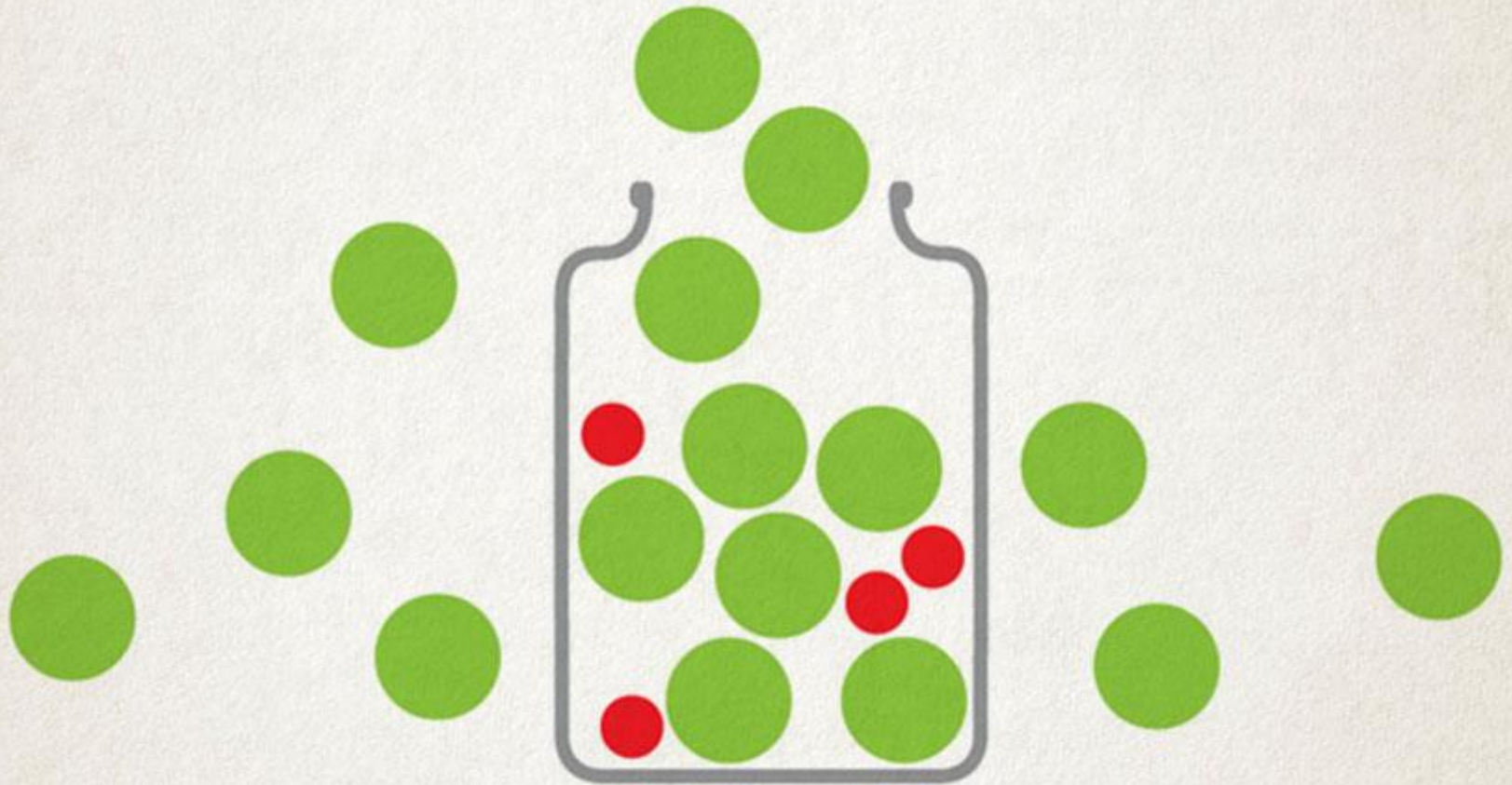
Enrich It



Absorb It



Link Positive & Negative Material



Have It, Enjoy It

Let's Try It

Notice

something
beneficial in
awareness

Create

the experience
of gladness or
gratitude

Create

the experience
of feeling
cared about

For each of the above:

Have the experience. Enrich it. Absorb it.



Growing Inner Strengths

Two Wolves in the Heart



Inner Strengths

Understandings

Capabilities

Positive Emotions

Attitudes

Motivations

Virtues

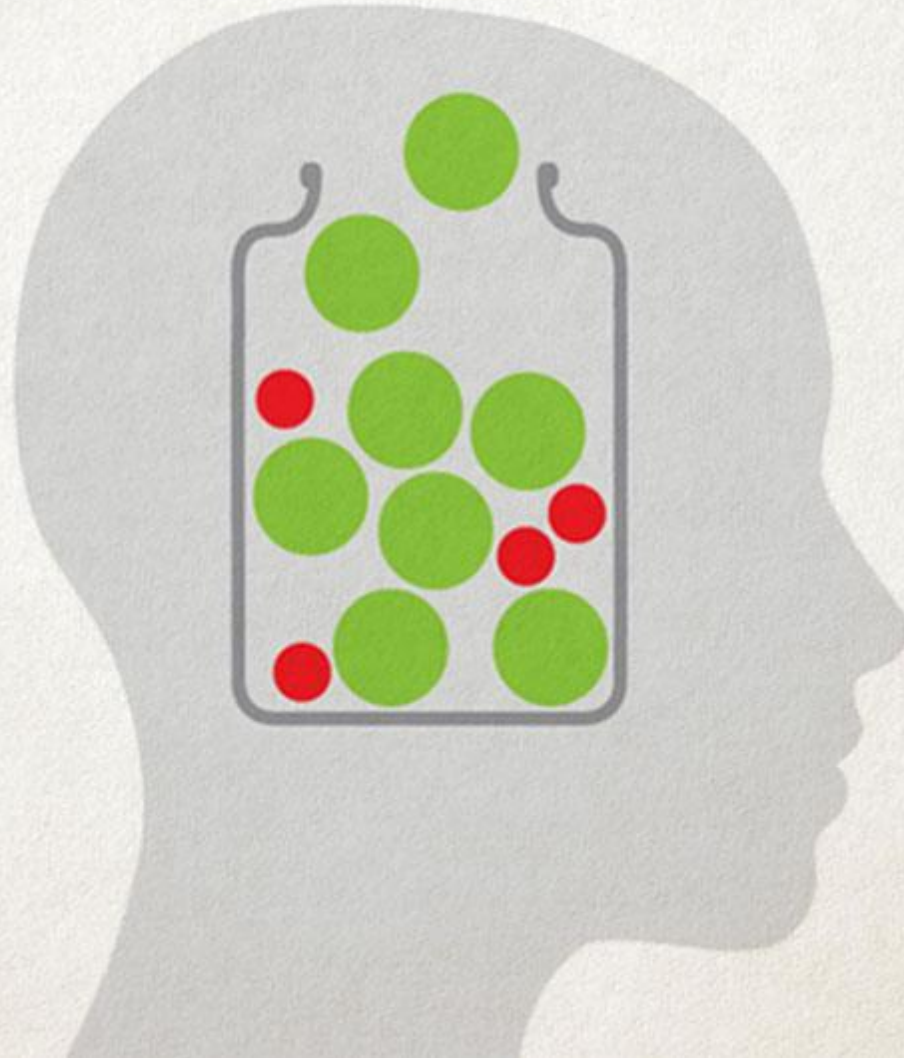


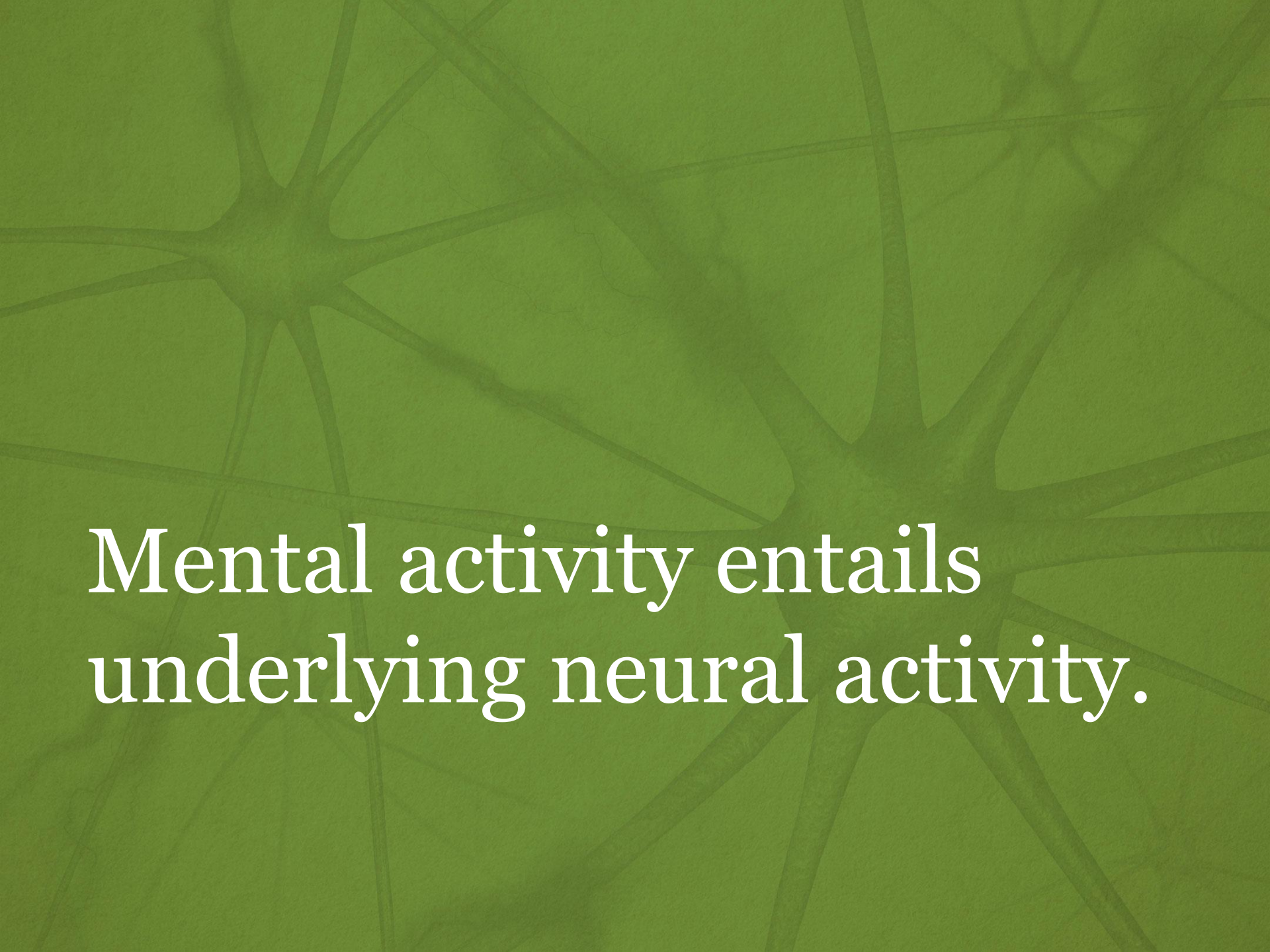
Pick a partner and choose an A and a B (A's go first). Then take turns, with one person speaking while the partner mainly listens, exploring this question:

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

What psychological resources – **inner strengths** – would you like to develop in yourself (perhaps through this program)?

Inner Strengths Are Built From Brain Structure



The background of the slide is a solid green color with a faint, stylized pattern of neurons. The neurons are depicted with dark green, branching processes (dendrites and axons) extending across the frame, creating a network-like structure. The text is centered and reads:

Mental activity entails
underlying neural activity.

Repeated mental activity
entails repeated neural activity.

Repeated neural activity
builds neural structure.



Neurons that fire together,

wire together.

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

Encoding > Consolidation

Activation > Installation

State > Trait

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

You become more **compassionate**
by repeatedly installing experiences
of compassion.

You become more **grateful** by repeatedly
installing experiences of gratitude.

You become more **mindful** by repeatedly
installing experiences of mindfulness.

Most experiences of inner strengths –
resilience, kindness, insight,
mindfulness, self-worth, love, etc. –
are **enjoyable**.

Without **installation** – without turning passing mental states into enduring neural structure – there is no learning, no change in the brain.

Activation without installation is pleasant,
but has no lasting value.

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



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, exploring this question:

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

What are some of the good facts in your life these days?

As the listener, keep finding a genuine gladness about the good facts in the life of our partner.

The Three Ways to Engage the Mind

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.

Mindfulness is present in all three.

“Being with” is primary – but not enough.

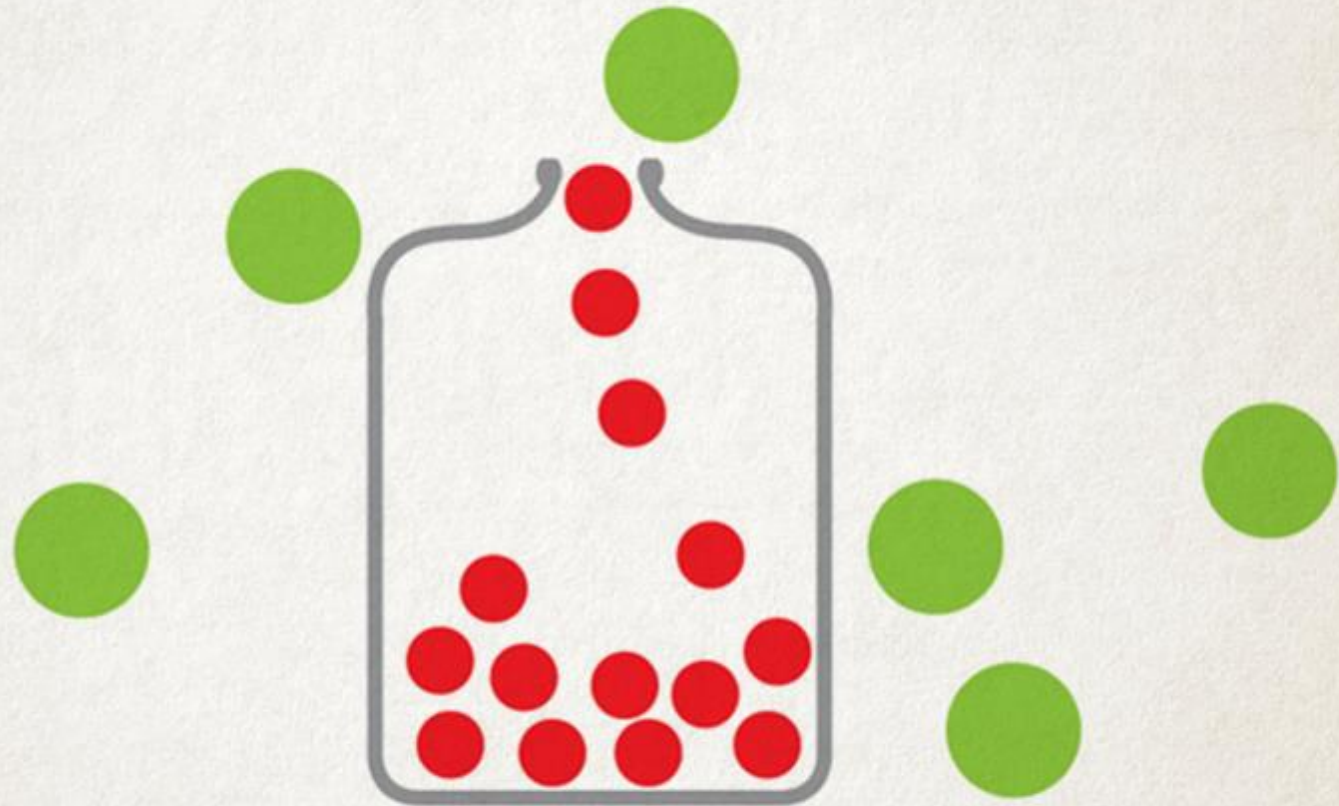
We also need “wise effort.”

Velcro for Bad, Teflon for Good

The negativity bias

bad experiences

good experiences



The Negativity Bias

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.

Mindfulness is present in all three.

“Being with” is primary – but not enough.

We also need “wise effort.”

That concludes Part 1:
The Essence of Positive Neuroplasticity

COMING NEXT:

2

Having, Enriching, and
Absorbing Experiences



2

Having, Enriching, and
Absorbing Experiences



Elements of Experience

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

Having Beneficial Experiences

How to Take in the Good: HEAL

Activation

1. **Have** a beneficial experience

Installation

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

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.

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

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.

How to Take in the Good: HEAL

Activation

1. **Have** a beneficial experience

Installation

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

Reflections So Far

You can notice or create a beneficial experience.

There are lots of ways to create experiences.

Beneficial experiences are usually based on facts.

Recognizing good facts does not deny bad ones.

Good facts about yourself are facts like any other.



Enriching Beneficial Experiences

How to Enrich an Experience

- **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

Absorbing Beneficial Experiences

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 to receive the experience into yourself.
- Sense the experience 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 it; let it change you.
- Be aware of ways the experience is rewarding.

*The good life,
as conceive it,
is a happy life.
I do not mean that
if you are good
you will be happy;
I mean that
if you are happy
you will be good.*

Bertrand Russell



Being for Yourself

- Bring to mind someone you are *for*. Find a sense of caring, support, being loyal, standing with someone as an ally. Know this stance toward someone.
- Apply this stance, this feeling, toward yourself.
- Recognizing your difficulties and burdens. Recognizing injustice applied to you. Recognizing the impacts on you.
- Finding determination that you not be mistreated, that you cope with challenges, that you be truly happy, having a good life as best you can.

That concludes Part 2:
Having, Enriching, and Absorbing Experiences

COMING NEXT:

3

Linking Positive and
Negative Material



3

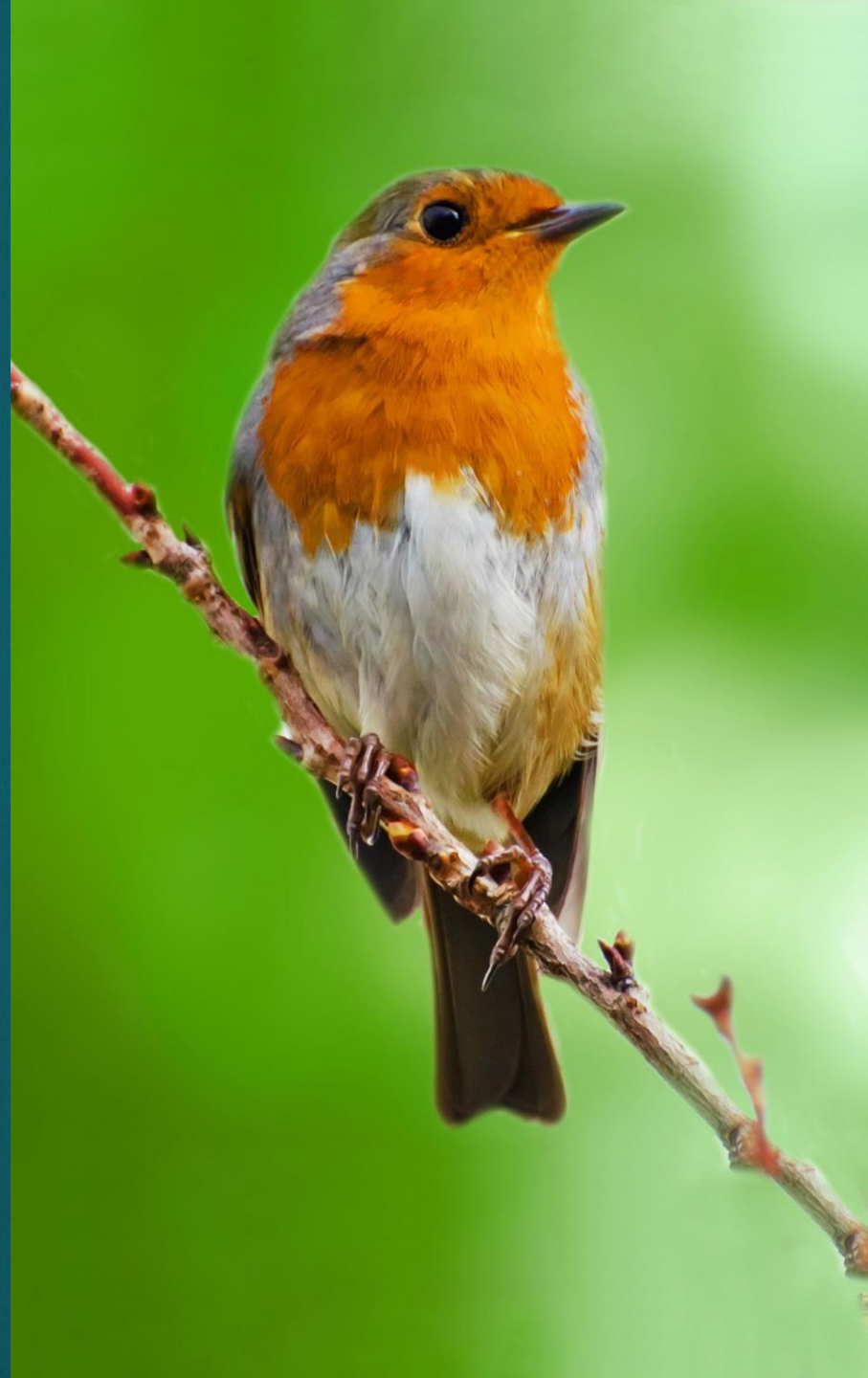
Linking Positive and Negative Material

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





Centering Practices

Centering Practices



**Feel
already
safe**



**Feel
already
satisfied**



**Feel
already
connected**



Key Resource Experiences

Our Three Fundamental Needs



safety



satisfaction



connection

Needs Activated by...



Safety

Unpleasant
Pain
Threat



Satisfaction

Pleasant
Opportunity
Loss



Connection

Heartfelt
Attraction
Rejection

Needs Met by Three Systems



Safety

Avoiding
harms



Satisfaction

Approaching
rewards



Connection

Attaching
to others

Needs Feel Met: **Responsive** Mode



When we feel basically **safe** – not disturbed by **threat** – the Avoiding system goes Responsive, with a sense of **peace**.



When we feel basically **satisfied** – not disturbed by **loss** – the Approaching system goes Responsive, with a sense of **contentment**.



When we feel basically **connected** – not disturbed by **rejection** – the Attaching system goes Responsive, with a sense of **love**.

The Responsive Mode is Home Base

In the **Responsive “green zone,”** the body defaults to a sustainable equilibrium of refueling, repairing and recovering.

The mind defaults to a sustainable equilibrium of:

Avoiding

Peace

Approaching

Contentment

Attaching

Love

This is the brain in its homeostatic **Responsive,**
minimal craving mode.

Needs Don't Feel Met: **Reactive** Mode



When we feel **unsafe** –
disturbed by **threat** – the
Avoiding system
goes Reactive,
with a sense
of **fear**.



When we feel **dissatisfied** –
disturbed by **loss** –
the Approaching
system goes
Reactive, with
a sense of
frustration.



When we feel **disconnected** –
disturbed by **rejection** – the
Attaching system
goes Reactive,
with a sense
of **heartache**.

The Reactive Mode is Leaving Home

In the **Reactive “red zone,”** the body fires up into the stress response: fight, flight, or freeze; outputs usually exceed inputs; long-term building projects are deferred.

The mind fires up into:

Avoiding

Fear

Approaching

Frustration

Attaching

Heartache

This is the brain in its allostatic **Reactive**, *craving* mode.

Coming Home, Staying Home

Meeting your core needs brings you home to the **Responsive** “green zone.”

Taking in the good Responsive states grows Responsive traits. In a wonderful cycle, these traits promote good states – which can strengthen your Responsive traits.

Responsive states and traits help you stay Responsive when the world is flashing red.



Can You Stay in the Green Zone When:

A solid green circle containing the text "Things are unpleasant?".

Things are
unpleasant?

A solid teal circle containing the text "Things are pleasant?".

Things are
pleasant?

A solid purple circle containing the text "Things are heartfelt?".

Things are
heartfelt?

Some Types of Resource Experiences

Avoiding Harms

Feeling basically
alright right now

Feeling protected,
strong, safe,
at peace

The sense that
awareness itself is
untroubled

Approaching Rewards

Feeling basically full,
the enoughness in this
moment as it is

Feeling pleased,
glad, grateful, satisfied

Therapeutic,
spiritual, or existential
realizations

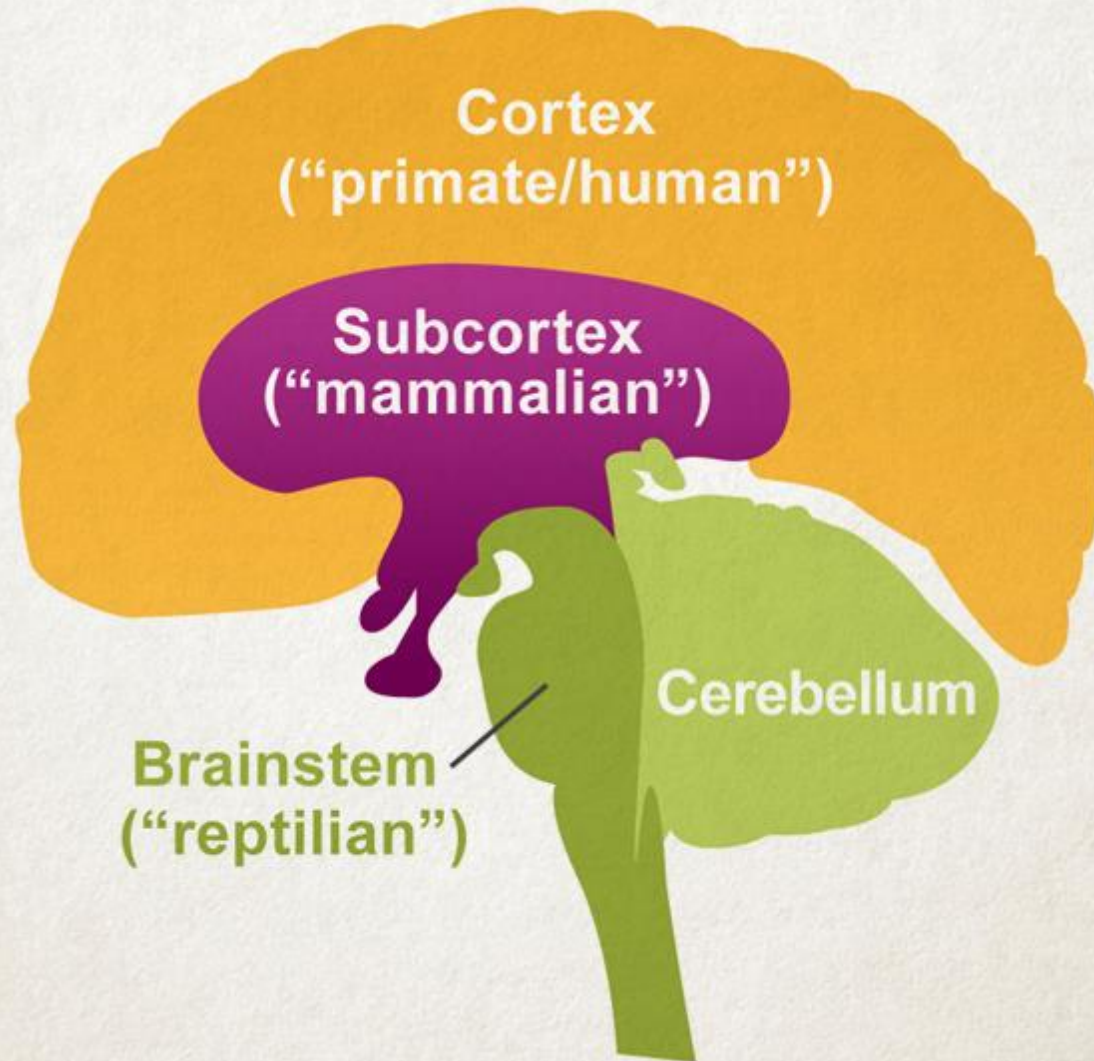
Attaching to Others

Feeling basically
connected

Feeling included, seen,
liked, appreciated,
loving

Feeling
compassionate, kind,
generous, loving

The Evolving Brain



Pet the Lizard



Feed the Mouse



Hug the Monkey



Linking Positive and Negative Experiences

“Negative” Material

- “Negative” material includes pain, worry, discomfort, helplessness, anger, frustration, disappointment, drivenness, addiction, loneliness, insecure attachment, hurt, jealousy, resentment, inadequacy, shame
- Comes from the presence of the “bad” and the absence of the “good”
- Activated explicitly and implicitly

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

HEAL by Taking in the Good

1. **Have** a beneficial experience.
2. **Enrich** it.
3. **Absorb** it.
4. **Link** it with negative material.
(Optional)

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.

That concludes Part 3:
Linking Positive and Negative Material

COMING NEXT:

4

Growing Strengths
For Safety



4

Growing Strengths For Safety



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, exploring this question:

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

What do you want to take home from this program so far?
(key ideas and experiences; what's been useful)

Multi-Purpose Inner Strengths

Being on your own side

Centering

Calming

Love

Feeling cared about | Feeling caring | Self-compassion

Self-Compassion

Compassion is the wish that beings not suffer, with warm-hearted concern. Compassion is sincere even if we can't make things better.

Self-compassion simply applies this to oneself.

To encourage self-compassion:

1

Get the sense of being cared about.

2

Bring to mind beings you care about. Find compassion for them.

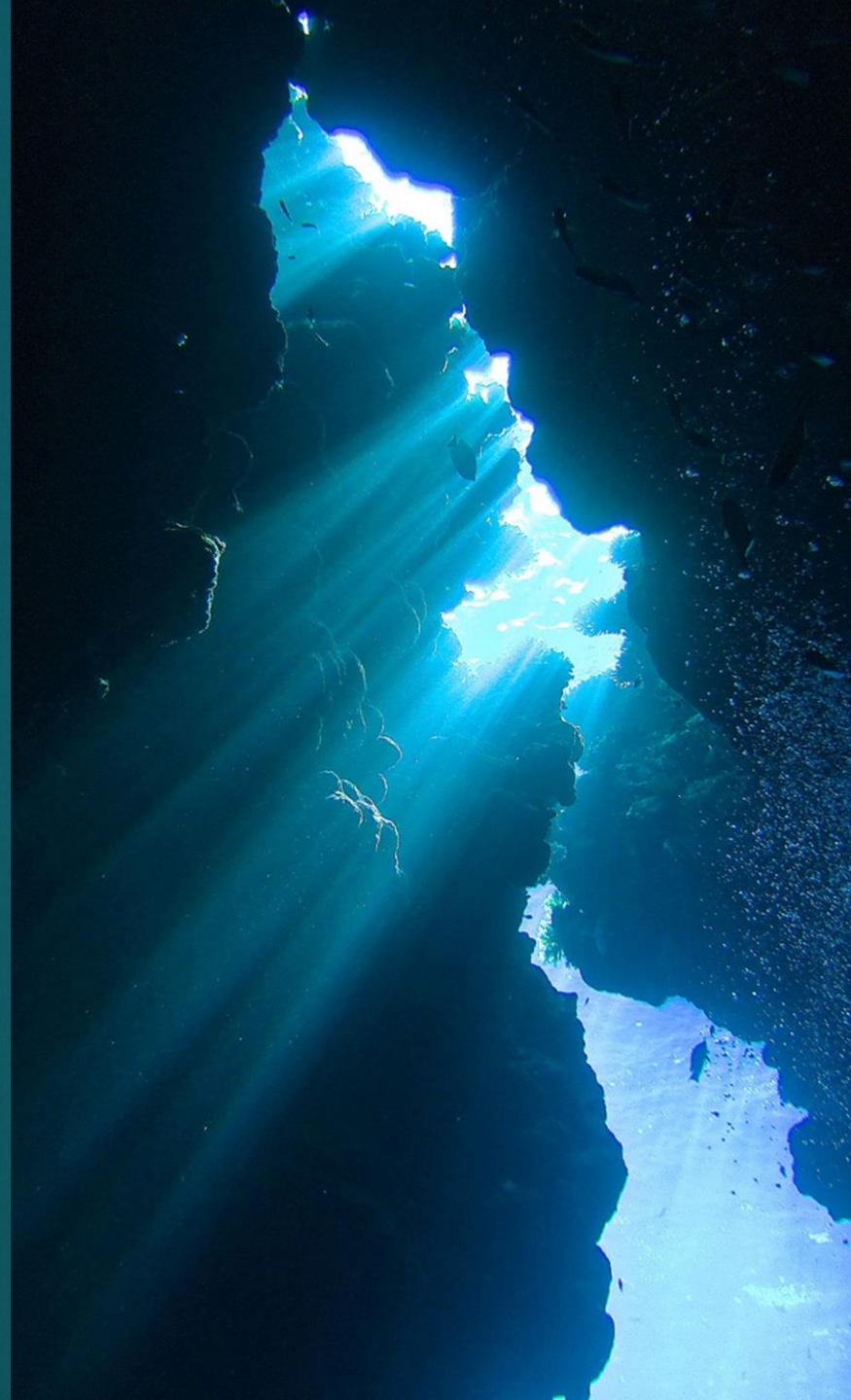
3

Shift the compassion to yourself.

“Anthem”

*Ring the bells that can still ring
Forget your perfect offering
There is a crack in everything
That's how the light gets in
That's how the light gets in*

Leonard Cohen



Reflections on Fear

- Fear is normal. Avoiding harms is fundamental.
- Much anxiety is unnecessary and unreasonable.
- We tend to overestimate threats and underestimate opportunities and resources.
- People can be afraid . . . to give up fear.
- Remember that you can give up unnecessary anxiety and still remain appropriately cautious, watchful, and strong.

Class 4: Strengths for Safety

Feeling protected

Feeling alright right now

Handling threats in a Responsive way

Centering in peace, contentment, and love

Feeling Protected

- Protections in your setting
- Resources inside you and in your life
- Other beings who could help protect you
- Imagining a shield, a force field protecting you
- Feeling as safe as you reasonably can
- Needless anxiety falling away . . . No need to struggle with anything unpleasant inside you or out in the world . . .

Feeling Basically Alright Right Now

- Tuning into the body's signals that all is well right now
- Aware of breathing going fine . . . the heart beating . . . awareness itself keeps on going no matter what arises . . .
- Letting go of the past, not worrying about the future. Noticing that at least in this moment you are OK.
- Being alright, you can let go of any need to struggle with anything unpleasant.
- Feeling alright sinking into places inside that haven't . . .

Reactive Approaches to Pain or Threat

Disturbing and
depleting bodily
systems

Overestimating
threats and
underestimating
resources

Fear, anger,
immobilization,
helplessness

Fight, Flight,
Freeze

Strong sense of
I-me-mine

Vicious cycles
in relationships

Responsive Approaches to Pain or Threat

Sustainable
outflow,
intensity, pace

Centered, grounded,
in-balance

Fear or anger
contained in
mindfulness, calm,
strength

Perhaps positive
emotions
(e.g., confidence,
vigor)

Less sense of
I-me-mine

Assertive, firm;
cautious
but not cowed

Strengths Supporting Responsive Approaches to Pains and Threats

Recognizing costs of
Reactive mode;
knowing you can
deal with challenges
Responsively

Multi-purpose:
on your own side,
centered, calm, love

Feeling strong,
agency, protected,
alright, relaxed

Seeing threats
and resources
accurately

Finding refuges

Peace in
your core

Coming Home

Peace

Contentment

Love

That concludes Part 4:
Growing Strengths for Safety

COMING NEXT:

5

Growing Strengths
For Satisfaction



5

Growing Strengths For Satisfaction

Class 5: Strengths for Satisfaction

Sense of accomplishment

Finding beauty

Imagining the rewards of something
you'd like to help yourself want

Handling opportunities and losses
in a Responsive way

Centering in peace, contentment, and love



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, exploring this question:

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

What are some of the things you have **accomplished** in your life?

(Including lots of seemingly small things)

Take in your partner's recognition of you.

Explore this setting for things that are beautiful (or otherwise pleasureable) to you: sounds, sights, tastes, touches, smells, and thoughts. Look for little things.

Really **take in** the sense of beauty (or the sense of pleasure in general).

Liking and Wanting

- **Desire** (positively or negatively valenced):
 - Liking: enjoying, preferring, valuing, “nice to have”
 - Wanting: pressure, tunnel vision, insisting, “must have,” addiction, craving; different from simple determination, passion, ambition, aspiration, commitment
 - You can like without wanting and want without liking.
- **Liking without wanting: heaven; wanting without liking: hell.**
- Dealing with the unpleasant, pleasant, heartfelt, and neutral on the basis of liking without tipping into wanting is the essence of the Responsive mode.

Encouraging Motivation

In some ways, the key to life is helping yourself learn to want things that are good for you that you don't yet want.

It is said that wisdom is choosing a greater happiness over a lesser one.

To help your brain want and choose that greater happiness, associate anticipated rewards with whatever you want to encourage, by:

1

Before doing it,
imagine the rewards.

2

While doing it,
focus on the rewards.

3

After doing it,
recall the rewards.

Strengths Supporting Responsive Approaches to Opportunities and Losses

Seeing costs of
Reactive and
benefits of
Responsive

Multi-purpose:
on your own side,
centered, calm, love

Sense of
accomplishment,
beauty, fullness of
this moment,
rewards, pleasure,
gratitude, gladness

Finding enthusiasm
and passion

Making good plans
and drawing in
needed resources

Contentment in
your core

Coming Home

Peace

Contentment

Love

That concludes Part 5:
Growing Strengths for Satisfaction

COMING NEXT:

6

Growing Strengths
For Connection



6

Growing Strengths For Connection

Class 6: Strengths for Connection

Happiness at the good fortune of others

Feeling of worth

Empathy, given and received

Engaging relationships in a
Responsive way

Centering in peace, contentment, and love

The Tip of the Root

In the fourth step of TG, you could try to get at the youngest, most vulnerable layer of painful material.

The “tip of the root” is commonly in childhood. The brain is generally more affected by the negative experiences that occur in early childhood than by ones occurring later in life.

Prerequisites:



1

Understanding the
need to get at
younger layers

2

Compassion and
support for the
inner child

3

Capacity to “presence”
young material
without flooding

Feeling of Worth

- It is natural and important to feel that you have worth as a person – which does not mean arrogance or ego.
- **You develop this sense of worth through:**
 - Others including, appreciating, liking, and loving you
 - You respecting yourself
- **Take in experiences of being:**
 - Capable, skillful, talented, helpful
 - Included, wanted, sought out, chosen
 - Appreciated, acknowledged, respected
 - Liked, befriended, supported
 - Loved, cherished, special



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, exploring this question:

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

What are some of the good facts in your life these days?

As the listener, keep finding a genuine gladness about the good facts in the life of our partner.

Feeling of Worth

- It is natural and important to feel that you have worth as a person – which does not mean arrogance or ego.
- **You develop this sense of worth through:**
 - Others including, appreciating, liking, and loving you
 - You respecting yourself
- **Take in experiences of being:**
 - Capable, skillful, talented, helpful
 - Included, wanted, sought out, chosen
 - Appreciated, acknowledged, respected
 - Liked, befriended, supported
 - Loved, cherished, special



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, exploring this question:

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

What was that practice like for you, exploring feelings of worth?

While listening, be as empathic as you can with your partner.

Strengths Supporting Responsive Approaches to Closeness and Rejection

- Seeing costs of Reactive and benefits of Responsive
- Multi-purpose: on your own side, centered, calm, love
- Feeling of worth
- Feeling cared about
- Self-compassion
- Feeling caring; empathy
- Compassion for the other person
- Autonomy
- Clarity
- Acting with strength and with heart
- Love in your core



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, exploring these questions:

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

What are the
key benefits
for you from
this training?

What are your
key intentions
for the days and
weeks ahead?

In the Days Ahead

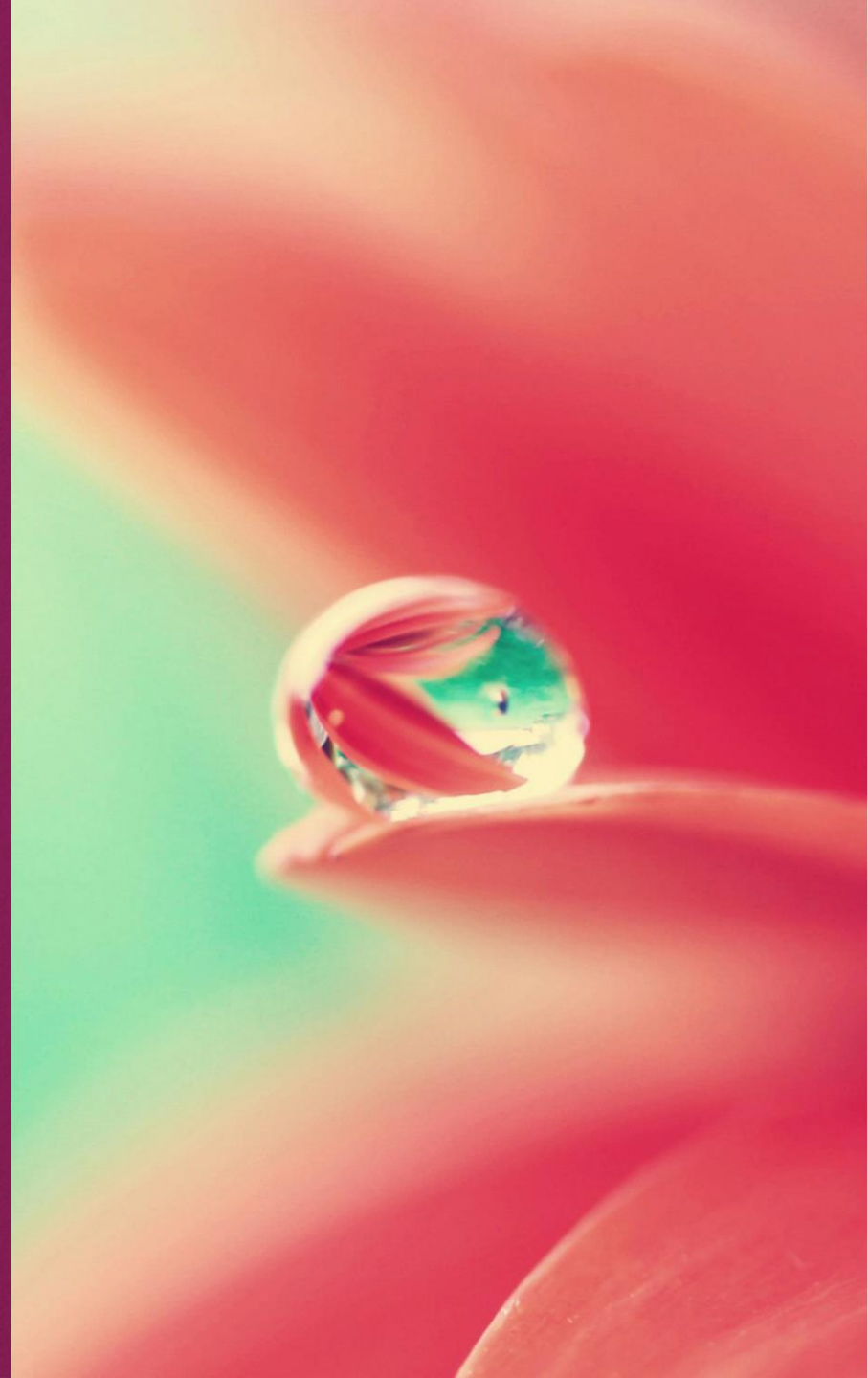
- Make taking in the good an informal daily habit
- At the end of any formal practices – meditation, exercise, journaling, prayer, yoga, walking the dog – take a few moments to take in the benefits
- Know what your current “vitamin C” is – and look for opportunities to feel it and internalize it
- Be mindful of the hedonic tone of experiences – unpleasant, pleasant, heartfelt, neutral – and help yourself tip toward the green zone about them

*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



Coming Home

Peace

Contentment

Love

Thank You



Suggested Books

See **RickHanson.net** for other good 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.

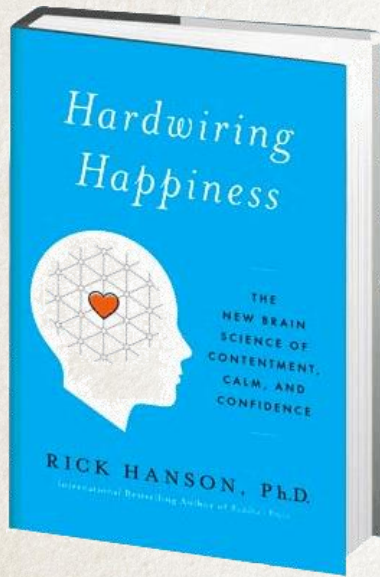
Key Papers – 3

- 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**

Wellspring Institute: **www.wisebrain.org**



youtube.com/drrhanson



facebook.com/rickhansonphd