Towards a Neurodevelopmentally Informed Model of Spiritual Growth

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How do we define spirituality?

- Spirituality “a personal affirmation of the transcendent…..often referred to feelings or experiences of connectedness or relationship with sacred beings or forces…….” (Paloutzian & Park, 2005, pg 26).

- “Spirituality is the sum total of the highest levels of developmental lines” (human capacities or forms of intelligence). (Wilber, 2000)

- “Spiritual perfection means compassion and nothing less and nothing else” (Fox, 1999, pg 34)
Common Stage Models

NORMAL EGO FUNCTIONING
(Western Psychology)

Moral conduct, simplifying life, slowing down, etc

CONTEMPLATION WITH INTERNAL REFLECTION-CALM

Moral conduct, simplifying life, slowing down, etc

UNITY MODES
(Self-object dichotomy gone, one with nature, connected to people)

TRANSCENDENTAL/TRANSPERSONAL/MYSTICAL

NONDUAL
(Beyond words, or rational thought)
Words of wisdom from Charles:

https://en.wikipedia.org/wiki/Charles_Manson
"‘After all.. ‘we are all one’. Killing someone therefore is just breaking off a piece of cooky.” (Zaehner, 1974, p. 69).

Hence nearly all contemplative traditions have practices devoted to grounding the person into the “real world”
Complete Model

NORMAL EGO FUNCTIONING
(Western Psychology)

PRELIMINARIES:
Moral conduct, simplifying life, slowing down, etc.

MINDFULNESS & CALM

UNITY MODE:
(Self-object dichotomy gone, one with nature, connected to people)

NONDUAL
(Beyond words, or rational thought)

TRANSCENDENTAL/TRANSPERSONAL

REALATIVE REALITY DUALITY

COMPASSION

No compassion
Compassion

http://www.motherteresa.org/
“‘I see God in every human being. When I wash the leper’s wounds, I feel I am nursing the Lord Himself. Is it not a beautiful experience?’”

http://www.motherteresa.org/
Horton the Elephant

- To find spirit or the One within each—dedicated to valuing others.

“A person’s a person no matter how small”


Integration of Paths?

- Kabat Zinn “Perhaps the most “spiritual” thing any of us can do is simply to look through our own eyes, see with eyes of wholeness, and act with integrity and kindness”

- Dala Lama “..Buddhahood is achieved through the cultivation of both motivation and wisdom..”


Tripartite conceptualization of spirituality:

**COGNITIVE-EMOTIONAL (CULTURAL)**
- Creativity
- Curiosity
- Learning
- Authenticity
- Bravery
- Persistence
- Prudence
- Modesty
- Self-Regulation
- Insight
- Gratitude
- Hope
- Humor
- Religiousness

**TRANSCENDENT**
- Sacred
- Mystical
- Beyond Words
- Ultimate Concern
- Nondual Reality
- Unknowable
- God
- Brahman-Atman
- Emptiness

**COMPASSION**
- Love
- Empathy

Selfless Compassion
Shifting gears...now to the unfolding brain....
Grand Summary of Neurodevelopment

Neuronal Activity

AGE

CONCEPTION

Weeks

BIRTH

Years

Decades

DEATH
Major Neurodevelopmental Events

- **Neurogenesis**: production and migration of neurons
- **Synaptogenesis**: creation of axons (signal cables) and sprouting of dendrites (receivers for axons) to form synapses.
- **Pruning and Myelination**: creation of memory and functional behavioral systems (neuropsychological systems)
3 Weeks Gestation

http://www.babycenter.com/6_your-pregnancy-3-weeks_1049.bc
Neural Tube Formation

The early neural tube is subdivided into the ventricular zone, where cell division occurs, and the marginal zone. The bottom diagram shows the movements of the cell body during one cycle of cell division in a neuronal precursor cell. Moving from top to bottom, the cell is shown at different phases of the cell cycle, as indicated by the letters to the right of the cell. The daughter cells can either reenter the cycle or migrate out of the ventricular zone.

Grand Summary of Neurodevelopment

Neurogenesis

AGE

Conception

Death

Weeks

Years

Decades
Rudimentary Brain in Place by 6 weeks Gestation

http://www.pregnology.com/faralong.php
Grand Summary of Neurodevelopment

AGE

NEUROGENESIS

SYNAPTOGENESIS
Picture trillions of these moving to connect

As the layer of “neuronal seeds” sprouts “wires” the nerve cells get pushed outward.
By the time of birth there are 87 billion neurons (27 billion in the neocortex alone): Half excitatory and half inhibitory: Reverberating back and forth over can you guess how many miles of axonal wiring?
Outer shell = NEOCORTEX

- A densely packed **CONTINUOUS** layer of nerve cells or neurons on the very outer shell of the brain all acting as tiny batteries
- 2-3 mm thick
- 256 sq inches sheet
Cross Section of Neocortex: Stained Pyramidal Neurons

DENDRITES

YES/NO

AXONS
Can you guess how many synapses we have around the time of birth?
Do you know how much this really is?
Grand Summary of Neurodevelopment

Conception

Weeks

Years

Decades

Neurogenesis

Synaptogenesis

Myelination & Pruning

AGE
Neurodevelopmental Equation

- "Neurons that fire together wire together"
- Neuronal "Fingerprints" of Conscious Functioning = Innate genetically controlled neuronal activity events (critical windows) + Innately determined talents or deficits (temperamental/ability traits) + Environment (local/global culture, nutrition, etc.)

Complex pruning begins BOTH innately from genetic timing/propensities, and from environmental interaction leading to only certain connections (vast networks) being left in place.
This can quantified through MRI images of the brain since by recording thickness of the neocortex—as you cut synapses and add white matter your neocortex gets thinner and you go from the magic of childhood to a specialized adults with an identity, job, role, etc.

THINNER NEOCORTEX = SPECIALIZATION OF FUNCTION
Cortical Thinning from Age 5 to 20

Abilities Can Also Be Predicted

After age 20……


Past early middle age...

50-60 becomes leveling off point for innately driven major cortical restructuring

Why is understanding brain development important?

**Important Point #1**

- Mother nature creates potentialities of human functioning that requires environmental/cultural shaping for limited periods of time.

- WE MUST TAKE ADVANTAGE OF THESE HIGHLY SPECIALIZED WINDOWS OF NEUROPLASTICITY OR FUNCTION(S) WILL BE PERMANENTLY IMPAIRED.
Regional Pruning Corresponds to Known Brain Networks for Functions Predicting Developmental Stages

Weeks

Years

Decades

0 16 2 4 6 10 12 18 8 14 20 13 32 26 30 28 36 24 22 33 34 3 4 16 7 5

AGE

MYELINATION & PRUNING

Erickson-Generativity vs. Stagnation
Erickson-Intimacy vs. Isolation
Erickson-Identity vs. Confusion
Erickson-Industry vs. Inferiority
Erickson-Autonomy vs. shame
Erickson-Trust vs. Mistrust
Mahler & Bowlby-attachment & separation

Piaget-Formal Operational
Piaget-Preoperational
Piaget-Sensory-Motor

Jung-Morning to Afternoon
Jung-Integrity vs Despair

CONCEPTION

DEATH
Implications for neurodevelopmentally informed spiritual development/well being?

- Because of both cultural and economic factors the American family is experiencing less time to nurture their developmental stages, particularly those related to emotional and contemplative skills.
- There is nearly a complete lack of mental health screening and emotional/contemplative education in the school systems.
- The needs of the middle age person whose brain is undergoing a huge developmental change is equally important to earlier stages of development but often times is neglected.
Important Point #2

> Just as we must address strengthening peoples abilities to improve or protect for well being/spirituality, we must also address innate pathological structures that arise during development.

> The old dogma of psychopharmacology being the explanatory model of psychiatry (i.e. to much/to little dopamine, serotonin, etc.) is now viewed as much more limited. Serious questions are being raised about the long term efficacy and hazards of psychiatric drugs especially in pediatrics.

Most psychiatric disorders now have neurodevelopmental hypothesis with growing data to support them.
Many Psychiatric Disorders Emerge From Pruning/Connecting Gone Awry

AGE
Because we can now see most psychiatric disorders as arising from complicated, hugely interconnected slabs of neocortex, involving many neurotransmitters, and we do not have an exact drug that changes the pathological underpinnings of such vast neurodevelopmental pathology—we must remind ourselves of the earlier equation.

\[
\text{Cortical-Behavioral Functioning} = \text{Innate genetically controlled neuronal activity events (critical windows)} + \text{Innately determined talents or deficits (temperamental/ability traits)} + \text{Environment (local/global culture, nutrition, etc.)}
\]
Important Point #3 (and final point)

Each spiritual domain and level likely has its own unique neuronal fingerprint

- Future studies should look at the evolution of traits vs. states or learning modes over the life span
- Operational definitions must be created based upon the religious/contemplative traditions themselves
Highly Recommended General Neurodevelopment Papers and Website for Movie

Core Papers:

Movie:
http://users.loni.usc.edu/~thompson/DEVEL/dynamic.html
RESEARCH STUDY ON COMPASSION AND SPIRITUAL DEVELOPMENT

PLEASE HELP US!

People of all ages, faiths, and spiritual practices are being sought to participate in a research study seeking to improve ways of measuring spiritual growth. We are also seeking individuals who are spiritual or religious teachers/authorities to provide advice and/or collaborate on developing practice specific measures.

We are excited to learn about your insights, and how your particular practice has influenced your life. The study uses interviews by phone or in person, asks participants to fill out questionnaires, and in some cases records EEGs to look at brain functioning related to well being.

YOUR HELP IS VERY MUCH NEEDED AND APPRECIATED!

For any questions or interest in the study, please contact Michael Johnson at michael.johnson@hsc.utah.edu

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