Absorption, Daydreaming, and Meditation

States of Altered Attention

- “Everyday” States
  - Absorption and Flow
  - Daydreaming and Mind-Wandering
- “Exotic” States
  - Meditation and Mystical Experiences
    - Yoga, Transcendental Meditation
    - Zen, Mindfulness Meditation

Absorption

Tellegen & Atkinson (1974); Tellegen (1987)

- Cognitive Restructuring of Self and Ego Boundaries
  - Narrowed or Focused Attention
  - Departure from Everyday Modes of Thought
- Content Analysis
  - Responsiveness to Engaging or “Inductive” Stimuli
  - Vivid, Suggestive Images; Imagistic Thought
  - Cross-Modal Experiences (e.g., Synesthesia)
  - Absorption in Thoughts and Imaginings
  - Vivid Re-Experiencing of the Past
  - Episodes of Expanded Awareness
  - Experiences of Altered Consciousness

Absorption and the “Big Five” Structure of Personality

NEO Personality Inventory (Costa & McRae, 1985, 1992)

- Neuroticism, Extraversion
- Agreeableness, Conscientiousness
- Openness to Experience
  - Richness of Fantasy Life
  - Aesthetic Sensitivity
  - Awareness of Inner Feelings
  - Need for Variety in Actions
  - Intellectual Curiosity
  - Liberal Value System

Aspects of Absorption

Tellegen (1982)

- Responsiveness to Engaging Stimuli
  - I can be deeply moved by a sunset
- Synesthesia
  - Some music reminds me of pictures or changing color patterns
- Enhanced Cognition
  - I can often somehow sense the presence of another person before I actually see or hear her/him
- Obliviousness/Dissociative Involvement
  - While watching a movie, a TV show, or a play, I may become so involved that I may forget about myself and my surroundings and experience the movie as if it were real and as if I were taking part in it
- Vivid Reminiscence
  - Sometimes I feel and experience things as I did when I was a child
- Enhanced Awareness
  - Things that might seem meaningless to others often make sense to me

An Expanded Concept of Openness

Glisky & Kihlstrom (1993)

- Absorption, $r = .15$
  - Absorption
    - Fantasy, Aesthetic Sensitivity, Feelings
- Socio-Political Liberalism, $r = .03$
  - Intellectual Curiosity
  - Openness to Unusual Ideas, Variety in Thought and Action, Liberal Values
- Intellectance, $r = .05$
  - Inquiring Intellect, Culturedness
**Imaginative Involvements**  
**J. Hilgard (1970)**

- **Reading**
- **Drama**
  - The Method vs. Technical Acting
- **Sensory Stimulation**
  - Nature
  - Art, Music
  - Direct Sensory Experience
- **Adventure**
  - Physical vs. Mental "Space Travelers"

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**The Book-Reading Fantasy**

**Shor (1970)**

- **Vivid Imagination**
  - Equivalent to Living the Experience Itself
  - Fantasy Totally Compelling
    - Visual
      - Color
      - 3 Dimensions
    - All Modalities of Imagery
- **Oblivious to True Reality**
- **Unaware of Active Imagination**
- **Alert to Important Events**
  - But at Nonconscious Level

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**Involved Readers**

**J. Hilgard (1970)**

- **Two Types of Book-Reading Fantasy**
  - Character Identification
  - Empathic Identification
- **Characteristics of Involved Readers**
  - Influenced by Power of Words
  - Not Passive; Actively Open to Influence
  - Pleasure in Experience
  - Vivid Imagery (Especially Visual)
  - Suspend Critical Processes
  - Time-Limited

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**Reading as Consciousness Change**

**Nell (1988)**

- **Aspects of Reading for Pleasure**
  - "World-Creating Power of Books"
  - "The Reader’s Effortless Absorption"
- **Components of Ludic Reading**
  - Playful; Stands Outside Ordinary Life
  - Absorbs Player/Reader Completely
  - Unproductive
  - Circumscribed by Space and Time
- **Fiction, Narrative Nonfiction**
  - 1+ Books / Week

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**“The Method” in Acting**

**Stanislavski (1863-1938)**

When an actor is completely absorbed by some profoundly moving objective, so that he throws his whole being passionately into its execution, he reaches a state that we call inspiration. In it almost everything he does is subconscious and he has no conscious realization of how he accomplishes his purpose.

- *An Actor Prepares* (1936)
- *An Actor’s Work* (1938)

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**Flow**

**Csikszentmihalyi & Csikszentmihalyi (1988); Csikszentmihalyi (1990)**

- A state in which people are so involved in an activity that nothing else seems to matter;
- The experience itself so enjoyable that people will do it even at great cost, for the sheer sake of doing it.
Flow
Csikszentmihalyi & Csikszentmihalyi (1988); Csikszentmihalyi (1990)

• Flow (Optimal Experience)
  – Focused and Ordered State of Consciousness
  – Equivalent Ratio of Skills to Challenges
  – Contents of Consciousness Congruent with Goals
  – Mental Energy Flows Effortlessly

• Contrast with Psychic Entropy
  – Information Conflicts with Existing Intentions
    • Prevents Their Execution

Flow as a “Peak Experience”
Maslow (1954, 1968)

• Achieving Unique Inner Potential
  • B[eing]-Values
    – Wholeness, Perfection
    – Completion, Justice
    – Aliveness, Richness
    – Simplicity, Beauty
    – Goodness, Uniqueness
    – Truth, Self-Sufficiency
    – Effortlessness, Playfulness

The Peak Experience
Maslow (1959)

• “The experience or the object tends to be seen as a whole, as a complete unit, detached from relations, from possible usefulness, from expediency and from purpose”
• “The percept is exclusively and fully attended to”
• Perception can be relatively ego-transcending, self-forgetful, egoless”
• “Disorientation in time and space”
• “Unity of consciousness”

Sampling the Peak Experience
Maslow (1959)

I would like you to think of the most wonderful experience or experiences of your life; happiest moments, ecstatic moments, moments of rapture, perhaps from being in love, or from listening to music or suddenly “being hit” by a book or a painting, or from some great creative moment. First list these.
And then try to tell me how you feel in such acute moments, how you feel differently from the way you feel at other times, how you are at the moment a different person in some ways.

“Unity of Consciousness”
Maslow (1968)

In some reports... the whole of the world is seen as unity, as a single rich live entity.
In other of the peak experiences, most particularly the love experience and the aesthetic experience, one small part of the world is perceived as if it were for the moment all of the world.
In both cases the perception is of unity.
Probably the fact that the B[eing]-cognition of a painting or a person or a theory retains all the attributes of the whole of Being, i.e., the B[eing]-values, derives from this fact of perceiving it as if it were all that existed at that moment.

Aspects of Daydreaming
Rational Scales of the Imaginal Processes Inventory
Singer & Antrobus (1970)

• Daydreaming Frequency
• Nightdreaming Frequency
• Absorption in Daydreaming
• Acceptance of Daydreaming
• Positive Reactions to Daydreaming
• Frightened Reactions to Daydreaming
• Visual Imagery in Daydreams
• Auditory Imagery in Daydreams
• Problem Solving Daydreams
• Present Orientation in Daydreams
• Future Orientation in Daydreams
• Past Orientation in Daydreams
• Bizarre-Improbable Daydreams
• Mindwandering
• Achievement-Oriented Daydreams
• Hallucinatory-Vividness of Daydreams
• Fear of Failure Daydreams
• Hostile Daydreams
• Sexual Daydreams
• Heroic Daydreams
• Guilt Daydreams
• Interpersonal Curiosity
• Impersonal-Mechanical Curiosity
• Boredom Susceptibility
• Mentation Rate
• Distractibility
• Need for External Stimulation
• Self-Revelation
Dimensions of Daydreaming
Short Imaginal Processes Inventory
Huba, Singer, Aneshensel, & Antrobus (1982)

- Positive-Constructive Daydreaming
  - A really original idea can sometimes develop from a really fantastic
    daydream.
  - My fantasies usually provide me with pleasant thoughts.

- Guilt and Fear-of-Failure Daydreaming
  - In my fantasies, a friend discovers I have lied.
  - I imagine myself failing those I love.

- Poor Attentional Control
  - I am the kind of person whose thoughts often wander.
  - I find that I easily lose interest in things that I have to do.

Daydreaming and Information Processing
Antrobus (1968)

- Vigilance Task (2 hours)
  - Press Specific Button to Specific Tone
  - Monetary Incentive for Hits

- Information Load
  - Rate of Presentation
    - 1 tone / 5, 1, or 0.5 Seconds
  - Number of Tones
    - 1, 2, or 3 Tones

- Thought-Sampling (Every 15 Seconds)
  - Stimulus-Independent Mentation
    - Task-Unrelated Intrusive Thoughts (TUITs)

Stimulus-Independent Mentation
Antrobus (1968)

Stimulus-Independent and Task-Unrelated Thoughts
(SITUTs)
Stawarczyk et al. (2010)

Absent-Mindedness
Cognitive Failures Questionnaire
Broadbent et al. (1982); Rast et al. (2008)

- Forgetfulness
  - Of Knowledge or Plans
    - Do you find you forget people’s names?

- Distractibility
  - Especially in Social Situations
    - Do you find yourself suddenly wondering whether you’ve used a
      word correctly?

- False Triggering
  - Interrupted Processing of Cognitive/Motor Activities
    - Do you find you forget why you went from one part of the house
      to the other?

“Zoning Out” During Reading
Schooler et al. (2005)

- Read Attention-Demanding Text
- Assessments of Mind-Wandering
  - Self-Caught
  - Probe-Caught
- Subjects Often Unaware of Mind-Wandering
  - Especially When Caught by Probe
The Paradox of Mind-Wandering
Schooler (2002); Schooler et al. (2005); Smallwood & Schooler (2006)

• Not Just “Zoning Out”
  – Attention Decoupled from Primary Task
  – Control Shifted from Primary Task to Personal Goals
  – Decreases During Controlled Processing
  – Contributes to Attentional Resources
  – Increases with Practice and Skill

• Unconscious
  – No Conscious Intention to Shift
  – No Conscious Awareness that Shift Occurred

Consciousness and Meta-Consciousness
Schooler (2002)

• “Basic Consciousness”
  – Perceptions, Feelings, etc.
• Meta-Consciousness
  – Explicit, Reflective Awareness of Contents of Consciousness
• Tacit Monitoring
  – Checks Consciousness for Goal Failures, Unwanted Thoughts, etc.

Two Views of Brain Function
Raichle (2010a, 2010b)

• Sherrington (1906): Brain as Reflex
  – Activated by Environmental Stimuli
  – Implicit in Functional Neuroimaging
  • Collect Activations by Stimuli or Tasks
  • “Subtract Out” Baseline Activity
• Berger (1929): Brain in Constant Activity
  – EEG is Active Even When Subjects Are At Rest
  • Alpha Activity as “Berger Rhythm”

Two Modes of Brain Activity
Raichle (2001, 2010)

• The Brain is Intrinsically Active
  – Invalid Assumption of Pure Insertion
  – Some Regions Active During Control Task
    • Eyes-Closed Rest / Maintain Visual Fixation
    – Deactivated by Goal-Directed Task
• Two Modes of Brain Activity
  – Task-Positive
    • Active Task-Engagement, Undistracted Focus
  – Task-Negative
    • Not Otherwise Engaged: Mind-Wandering/Daydreaming

The Default-Mode Network in the Brain
“Task-Negative” Network
Raichle et al. (2001)

Medial Temporal Lobe
Medial Prefrontal Cortex
Posterior Cingulate Cortex

Decreased Activity During Attention-Demanding Tasks

Increased Activity While Awake, Eyes Closed, Resting Quietly

The Default Mode Network in Action
Raichle (2010)
Identifying the True Default Mode Network

Appropriate Control: Thinking About Nothing At All

Eastern Meditative Traditions
Doniger, Encyclopedia of World Religions (1999)

• Raja Yoga
  – Based on Hindu Philosophy of Samkhya
  – Goal of Samadhi, or Total Self-Collectedness
    • Abolishes Distinction Between Meditator, Object

• Zazen
  – Based on Buddhism
  – Goal of Nirvana, or Enlightenment
    • Extinction of Desire, Individual Consciousness

Introduction to America
World Parliament of Religions
World’s Columbian Exposition
Chicago, 1893

• Yoga: Swami Vivekananda
• Zen: Soen Shaku

Secularization and Commodification of Yoga Meditation

Yoga
Hinduism

Transcendental Meditation
Maharishi Mahesh Yogi

Relaxation Response
Benson

Secularization and Commodification of Zen Meditation

Zen
Buddhism

Daisetz T. Suzuki

Mindfulness-Based Stress-Reduction
Kabat-Zinn (1990)

Three Kinds of Meditation?
Lutz et al. (2008)

• “One-Point” Meditation (Zen)
  – Focused Attention
    • Sustained Attention on Selected Object
  – Open Monitoring
    • No Focus on Object

• “Compassion” Meditation (Tibetan)
  – Contemplation of Suffering in World
Characteristics of Meditative Practices
Deikman (1966)

- Contemplation
  - Nonanalytic Apprehension
    - Banish Discursive Thought
    - Empty Mind of All but Percept
  - Thought as Interference
    - Essential Knowledge Obtained through Perception

Active vs. Full Contemplation
Deikman (1966)

- Active Contemplation (Initial Phase)
  - Exclude and Devalue Inner and Outer Stimuli
  - Concentration, Breathing Exercises as Diversions
- Full Contemplation (Final Phase)
  - Automatization of Contemplation
    - Contemplative Mode is Autonomous
      - Passivity, Surrender

Modes of Experience
Deikman (1966)

**Action Mode**
- Active Manipulation of Environment
- Increased Muscle Tension
- Focalized Attention
- Logical Thought
- Firm Ego Boundaries

**Receptive Mode**
- Passive Experience of Environment
- Decreased Muscle Tension
- Diffuse Attention
- "Alogical" Thought
- Self Merged with Objects

Features of Mystical Experience
Deikman (1966)

- Reality Transfer
  - Thoughts and Images Become Real
- Sensory Translation
  - Mental Processes Experienced as Physical Sensations
    - Heightened Attention
    - Absence of Analytic Thought
    - Receptive Attitude

Features of Mystical Experience
Deikman (1966)

- Unity Between Self and Object
  - Perception of Psychic Structure
  - Perception of Real Structure
    - Perceptual Expansion
- Ineffability
  - Primitive, Pre-Verbal?
  - Complexity
  - Trans-Sensate Phenomena
    - Experience Beyond Sensation, Memory, Thought

Meditation and Daydreaming
Hasenkamp et al. (2012)

A
- Sustained focus
- Awareness of Move
- Shifting Attention
- Hypothetical attention networks

B
- Mental imagery
- Brain activity
- Experience beyond
- s.

- Exercise beyond
- Thought
Brain Activation During Meditation
Hasekamp et al. (2012)

Effects of Meditation Practice
Hasekamp et al. (2012)

De-Automatization
Deikman (1966)

Automaticity Defined
LaBerge (1975); Posner & Snyder (1975); Schneider & Shiffrin (1977)

Is Automatization Permanent?

- Gain Conscious Awareness and Control of Automatic Processes
- Innate vs. Acquired
- Roots in the 1960s
  - Counterculture Movement
  - Psychedelic Drugs as a Route to Mystical Experience

• Inevitable Evocation
• Incorrigible Completion
• Effortless Execution
• Parallel Processing
• Unconscious
• Innate vs. Acquired
  – Proceduralization

- Reorganization of Interpretive Events
- Automatic Schemata
  – Adaptive
  – Limits
- Looking at Self and World in New Ways
Methodological Problems

- Studies of Religious Practitioners
  - Lack of Pre-Meditation Baselines
  - Self-Selection
  - Conflicting Vocabularies, Epistemologies
- Random Selection
  - Neophytes vs. Adepts
  - Absence of Sociocultural Surround

Meditation as a Route to De-Automatization?

- Not Much Research
  - Too Much Focus on Somatic Effects
    - "Relaxation Response"
  - Failure to Use Standard Tasks
- Constraints on De-Automatization
  - Sometimes Automatization is Adaptive

EEG Alpha Activity

- 8-12 cps, 10-150 microvolts
  - Occipital-Parietal Region of Brain
- Correlates
  - Arousal (Sleep)
  - Eyes Closed vs. Eyes Open
  - Cognitive Activity ("Looking")
- Phenomena
  - Alpha Density
  - Blocking (Orienting Response)
    - Replaced by Beta Activity
    - Habituation of Blocking

Increased Alpha Activity?

- Artifact of Eyes Closed
- Habituation
- "Not Looking"
- Not Associated with Particular State
  - Expectations

Psychophysiology of Yoga

Anand, Chhina, & Singh (1961)

- Raja Yoga, Samadhi Meditation
  - Oblivious to External, Internal Stimuli
- Subjects
  - 2 Experienced Yogis
  - Yogis-in-Training
- EEG Alpha
  - Density
  - No Blocking to Stimulus
  - No Habituation of Blocking

Psychophysiology of Zen

Kasamatsu & Hirai (1966)

- Subjects
  - Zen Masters, Disciples
- Practicing Zazen
  - Sitting, Eyes Open, Focused in Front
- EEG Alpha
  - Increased Density Despite Open Eyes
  - Blocking to Stimulus
  - No Habituation of Blocking
- EEG Theta
  - Increased Density Towards End
Yoga and Zen Compared  
Anand et al. (1961); Kasamatsu & Hirai (1966)

- Increased Slow-Wave Activity
  - Increased Alpha, Decreased Alpha Frequency
  - Increased Theta Activity
- Alpha Blocking
  - In Yoga: No Blocking
  - In Zen: Blocking Does Not Habituate

Failure to Replicate  
Becker & Shapiro (1981)

- Practitioners
  - Zen
  - Yoga
  - Transcendental Meditation
- Controls
  - Attend to Stimulus
  - Ignore Stimulus
- No Effects on EEG
  Alpha Blocking, Habituation

Startle During Meditation  
Levenson, Ekman, & Ricard (2012)

- Subject M.R.
  - Buddhist Monk with 40 Years’ Experience
  - PhD in Biochemistry
- Acoustic Startle: 6 Trials x 4 Conditions
  - “Open Presence” Meditation: “Pure Awareness”
  - Focused Meditation: Fixed Point
  - Distraction: Recall Details of Past Event
  - Unanticipated Startle
    - Comparison with Nonmeditator Controls

Comparison with Controls  
Levenson et al. (2012)

Cognitive Effects of Tibetan Buddhist Meditation  
Carter, Presti, et al. (2005)

- 76 Tibetan Monks
  - 5-54 Years Training
  - 3 “Retreatist” Meditators, > 20 years
- 2 Forms of Meditation
  - Compassion
    - Contemplation of Suffering in the World
    - Emanation of Loving Kindness
  - One-Point
    - Focus Attention on Single Object
    - Calm Mind, Reduce Internal/External Distractions
Binocular Rivalry
Porta (1893); Wheatstone (1838); Breese (1899, 1909)

- Present Different Images to Each Eye
  - Horizontal vs. Vertical Grating
- Random Alternation Between Images
  - Essentially Automatic
- Measures
  - Rivalry Rate (# Periods of Exclusive Visibility)
  - Phase Duration between Switches
  - Duration of each Period of Rivalry

Binocular Rivalry During Meditation
Carter, Presti, et al. (2005)

Cognitive Functions in TM

- Elderly Retirement Home Residents
- Practice 20 Minutes, 2x Daily, 12 Weeks
  - TM
  - Guided Attention (“Mindfulness”)
    - Word Production
      - Think in “New and Creative Ways”
  - Mental Relaxation
  - Control

Stroop Interference

Cognitive Consequences of Meditation
Wenk-Sormaz (2005)

- De-Automatization
  - Reduction in Habitual Patterns of Response
- Secular Meditation Exercise
  - Essentially Mindfulness Meditation
- Stroop Task
  - Before and After Meditation
  - Rest Control

Stroop Interference During Meditation
Wenk-Sormaz (2005), Experiment 1
Stroop Interference During Meditation

Wenk-Sormaz (2005), Experiment 1

Posttest

Response Latency

Meditation  Control 1  Control 2

Group

Stroop Interference During Meditation

Wenk-Sormaz (2005), Experiment 1

Change In Interference

Meditation  Learning  Age Match

Group

Attentional Strategies

Wenk-Sormaz (2005), Experiment 2a

• Meditation
• Rest
• Learning
  – Cognitive Control
  – Use Method of Loci to Learn Wordlist

Stroop Interference During Meditation

Wenk-Sormaz (2005), Experiment 2a

Pre-Test

Response Latency

Meditation  Learning  Rest

Group

Stroop Interference During Meditation

Wenk-Sormaz (2005), Experiment 2a

Post-Test

Response Latency

Meditation  Learning  Rest

Group

Stroop Interference During Meditation

Wenk-Sormaz (2005), Experiment 2a

Change in Interference

Meditation  Learning  Rest

Group
Meditation and De-Automatization
Wenk-Sormaz (2005)

- Meditation Leads to De-Automatization
  - Reduced Stroop Interference
  - Reduced Habitual Categorization
  - When Such Reduction is Optimal
- Effects of Meditation are Secular
  - Naïve Subjects, Randomly Assigned
  - No Theological/Cultural Overlay

Mindfulness-Based Stress Reduction
Kabat-Zinn (1990); Bishop et al. (2004)

- Secularized Derivative of Buddhist Practice
  - Moment-to-Moment Nonjudgmental Awareness
- “Operational Definition”
  - Sitting Meditation
  - Focus on Somatic Sensations of Own Breathing
  - Notice Thoughts and Feelings, Let Them Go
  - Return Attention to Breathing
  - Continue Practice Outside Formal Meditation
  - Focus Awareness on the “Here and Now”
  - Use Awareness as an Anchor

Two-Component Model of Mindfulness
Bishop et al. (2004)

- Self-Regulation of Attentional Focus
  - Alert to the Here-and-Now
  - Non-Elaborative Awareness (“Beginner’s Mind”)
  - Metacognitive Attentional Skills
  - Sustained Attention
  - Switching Attentional Focus
- Orientation to Experience
  - Attitude of Curiosity
  - Openness
  - Acceptance

Toronto Mindfulness Scale
Lau et al. (2006)

- Curiosity
  - I was curious about my reactions to things.
  - I was curious about what I might learn about myself by taking notice of how I react to certain thoughts, feelings, or sensations.
- De-Centering
  - I was more invested in just watching my experiences as they arose, than in figuring out what they could mean.
  - I was more concerned with being open to my experiences than controlling or changing them.

Five-Facet Mindfulness Scale
Baer et al. (2006, 2008)

- Nonreactivity to Inner Experience
  - I perceive my feelings and emotions without having to react to them.
- Observing/Noticing/Attending to Sensations/Perceptions/Thoughts/Images
  - I pay attention to sensations, such as the wind in my hair or sun on my face.
- Acting with Awareness
  - I find myself doing things without paying attention. (-)
- Describing/Labeling with Words
  - I’m good at finding the words to describe my feelings.
- Nonjudging of Inner Experience
  - I make judgments about whether my thoughts are good or bad (-)

Psychological Effects of Mindfulness Meditation

- Most Studies Involve Physiology, Emotion
  - Heart Rate, Blood Pressure
  - Mood, Anxiety
- Origins as Stress-Reduction Technique
  - Cognitive Change to “End Suffering”
- Effects on Stress, Emotion
  - But What About Cognitive Change?
MBSR and Cognitive Flexibility
Moore & Malinowski (2009)

- Meditators vs. Nonmeditators
  - Completed 6-Week “Beginner’s Course”
- Cognitive Tasks
  - Standard Stroop Test
  - “D2” Concentration and Endurance Test
    - Target-Cancellation Task
    - Multiple Measures of Attention

Hypnotic Effects on Stroop Interference
Raz et al. (2002)

- Highly Hypnotizable Subjects
- Suggested Agnosia (Alexia)
  - When I clap my hands, meaningless symbols will appear in the middle of the screen. They will feel like characters of a foreign language that you do not know, and you will not attempt to attribute any meaning to them. This gibberish will be printed in one of four ink colors....

Meditation and De-Automatization

- Stroop as Index of Automatic Processing
  - “Gold Standard”
- Meditation Reduces Stroop Processing
  - Not “Dose Dependent”?  
    - 15 Minutes vs. 6-8 Weeks
- But Effects Relatively Minor
  - Compared to Hypnosis
    - Suggested Agnosia/Alexia vs. Color-Blindness
- Maybe Stroop Isn’t the “Gold Standard”?  
  - At Least for Meditation