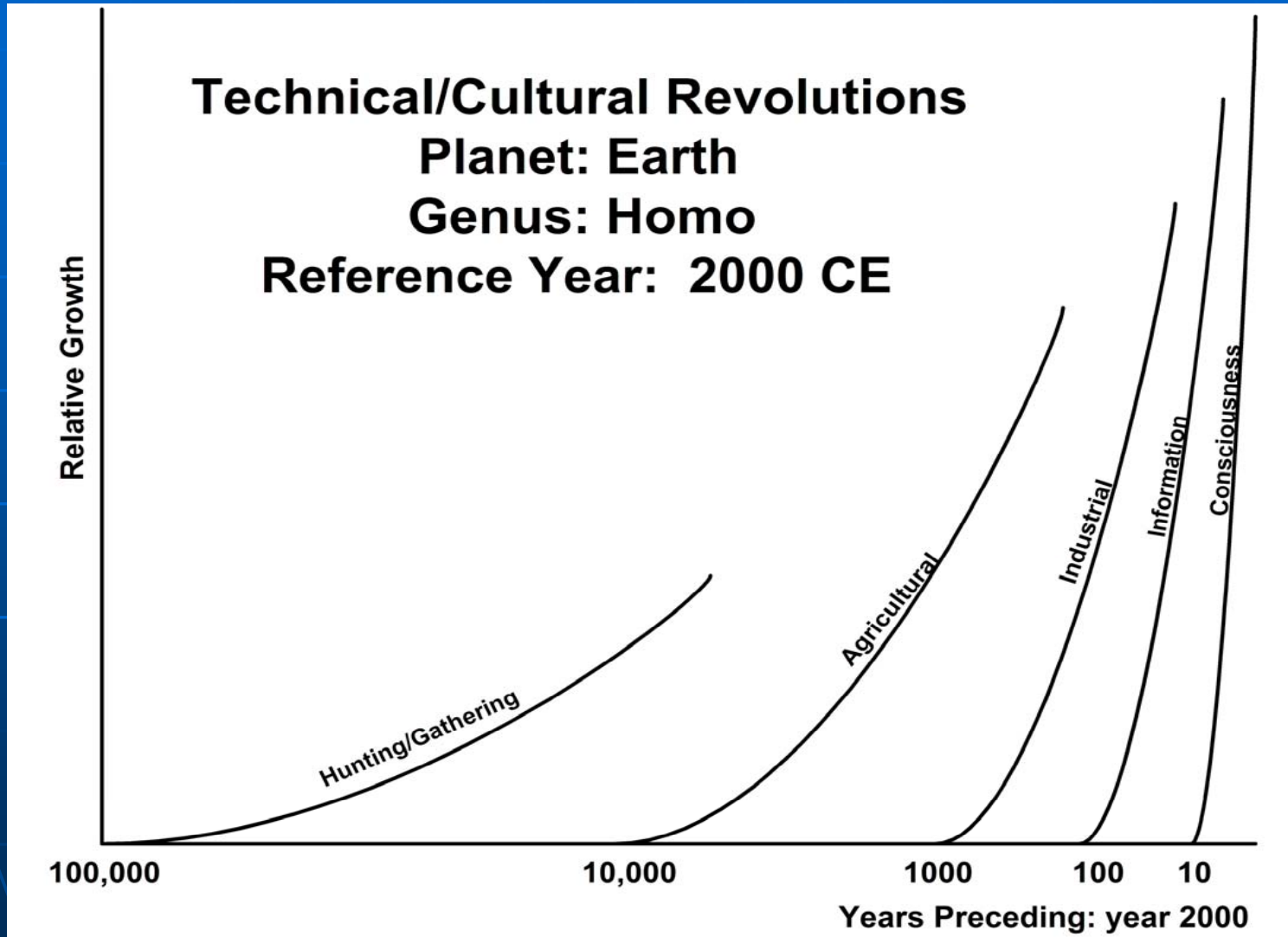


# Neurophysics

## A 21<sup>st</sup> Century approach to the Brain and Mind

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# Historical Perspective



# Scientific Reductionism

## A heirarchical approach to science

- Explain phenomena via constituent parts
- Scientific validation
- Appeal to known laws
- Identify emergent properties
- New vocabulary, methodology
- Provide unique level of explanation
- Enable new technologies

# Aerodynamics

- Fluids, materials, thermodynamics...
- Underlies ability to fly
- Captures previously impossible or mysterious elements
- Supplemented by electronics, control theory, etc
- Ultimately travel to moon & beyond
- Now entering commercial world

# Neurophysics

- Biology, physiology, cellular dynamics, information theory, control theory, quantum physics
- Enables scientific study of brain mechanisms
- Extend to “mysterious” elements of subjective mind, free choice
- Potential for “psi” phenomena

# Brain & Mind

- Brain is a 4-dimensional entity
  - 3 space, 1 time dimension
- Mind is a description of a process
  - Projection into other dimensions(?)
- Important to separate domains
  - Brain is more like a rock (being)
  - Mind is more like a dance (doing)

# Role of information

- Shannon – information captures improbability of outcome – not meaning
- Thermodynamics – information reflected in order
- Energy is required to organize a system
- Brain inputs information, expends energy, to self-organize
- Mind imparts meaning to information via judgement, emotion, valence

# Role of quantum theory

- Dispels concept of Cartesian, Newtonian clockwork universe
- Imposes limits on ability to know
- Introduces indeterminacy
  - Same starting conditions -> different outcomes
- Provides basis for action at a distance



# Coherence and Connectivity - I

- Communication is fundamental to organization and action
- Coherence is a measure of shared information
- Connectivity describes mechanisms of sharing information

# Coherence and Connectivity - II

- Ability to use pure information as building blocks
- Ability to manipulate time & space
- Underlies temporal binding, familiarization, learning, behavior
- Concept of mental “efficiency”
- Importance of normative values

# High-information physics

- Behavior of extraordinarily ordered systems
- “action” analog to a crystal
- Highly ordered system provides purity of experience
- Possible interactions between mind and matter, or between minds

# Time / frequency transforms

- Fourier, Gabor, Wigner, etc. transforms
- Inversion of coordinate axes
- Single point transforms to broad field
- Point in one domain is a wave in other domain
- Basis for “single-pointed” mind

# General Relativity

- Dispenses with "forces", "actions"
- Equivalence of matter & energy
- Unification of space and time into 4D
- Space/time tells matter/energy how to move
- Matter/energy tells space/time how it is "shaped"

# Neurorelativity - I

- Relativity between mind and experience
- Experience shapes the mind, structures subsequent processing
- Mind process experiences, produces judgements, incorporates subjectivity
- Brain is physical substrate of the mind
- Experience and action interact to produce subjective "reality"

# Neurorelativity - II

- Collapse (enfolding) of temporal information into spatial information
- Use of temporality to encode information
- Model incorporating energetics
- Intention as a “force”
  - Shapes mind field
  - Sets trajectories for future action

# Neurorelativity - III

- Consciousness as a field
- Consciousness can be quantified
- Result of high-information physics
- Relationship with energy, gravitation
- Quantum aspects relate to choice, and action at a distance



# Neurorelativity - implications

- Without experience, mind would never emerge
- With experience, mind is shaped
- Ability to act is a key to consciousness
- Quantity, orthogonality of experience determine degree of learning
- Mind spontaneously processes all experience

# Psi-related observations

- Activation/relaxation pattern observed in (chi-gong) energy healing
- Alpha comodulation observed in energy "sharing"
- Alpha phase synchrony observed in couples work
- Gamma bursting observed in clairvoyant (zener experiment)
- Mind-to-mind influence observed in presence of highly coherent alpha

# Levels of brain activity

- Brain as a substrate for layered activity
  - Normalization = stability
  - Activation = desynchrony
  - Relaxation = local synchrony
  - Coherence = global synchrony
  - Phenomena = emergent action

# Role of Neurofeedback - I

- Inform, shape concentration, relaxation, connectivity, phenomena
- Provide consistent, structured mental states & transitions
- Enable repeatability of rare states
- Possibility of hypercoherent states
- Akin to purifying radium

# Role of Neurofeedback - II

- “Neuronavigation” as a scientific practice
- Transcend limitations of language
  - Access to pure thought
  - Akin to art, dance, music
- Escape “folk” psychology
  - Currently bound by language

# Neurophysics - summary

- Opportunity to restructure “psychology”
- Opportunity to quantify, explore consciousness, mental dimensions
- Opportunity to “concentrate” raw elements
- Opportunity to transcend 4D time/space
- Extend information revolution to consciousness revolution