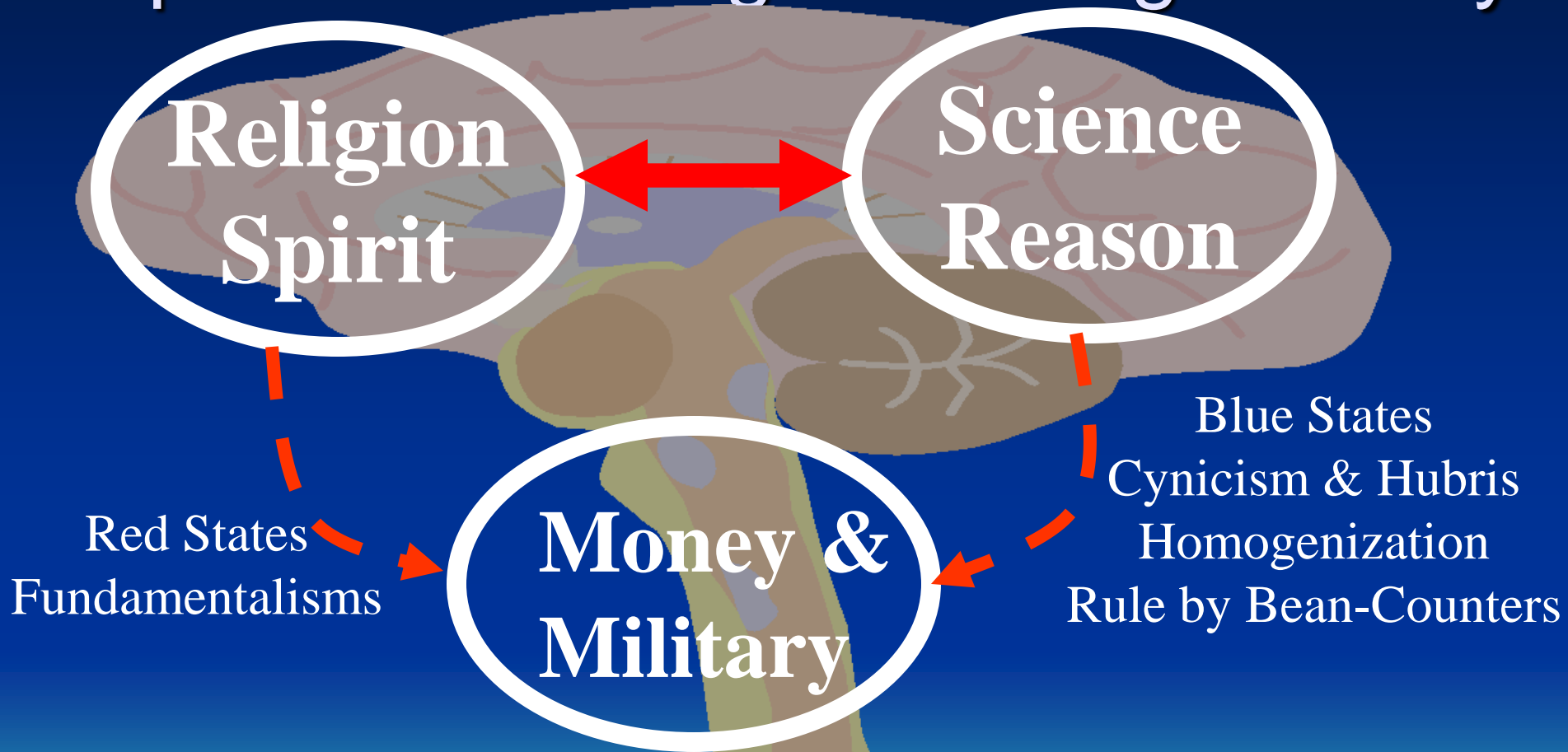


A Quaker Universalist View – Unified With Mathematical Science

- **View** of global dialogue – the inner dimension, in general and the situation today.
- **“Quaker”**: **Practice** of (group) meditation, to develop inner listening, holding the Light, and dialogue, to foster inner dialogue, groping towards peace. No big boss or official dogma; “self-organized” second hour discussion.
- **“Universalist”**: The query: “Do you draw on the great works and lessons learned all the major cultures and religions of earth, to inform your views and behavior?”
- “True”, but incomplete. In China, I might call myself a Daoist, in Greece a Pythagorean. Objective n-dimensional truth is portrayed correctly in several 2-D photographs, but only the N-dimensional unity is the full story.



Religion – Science: Still the most important challenge to dialogue today



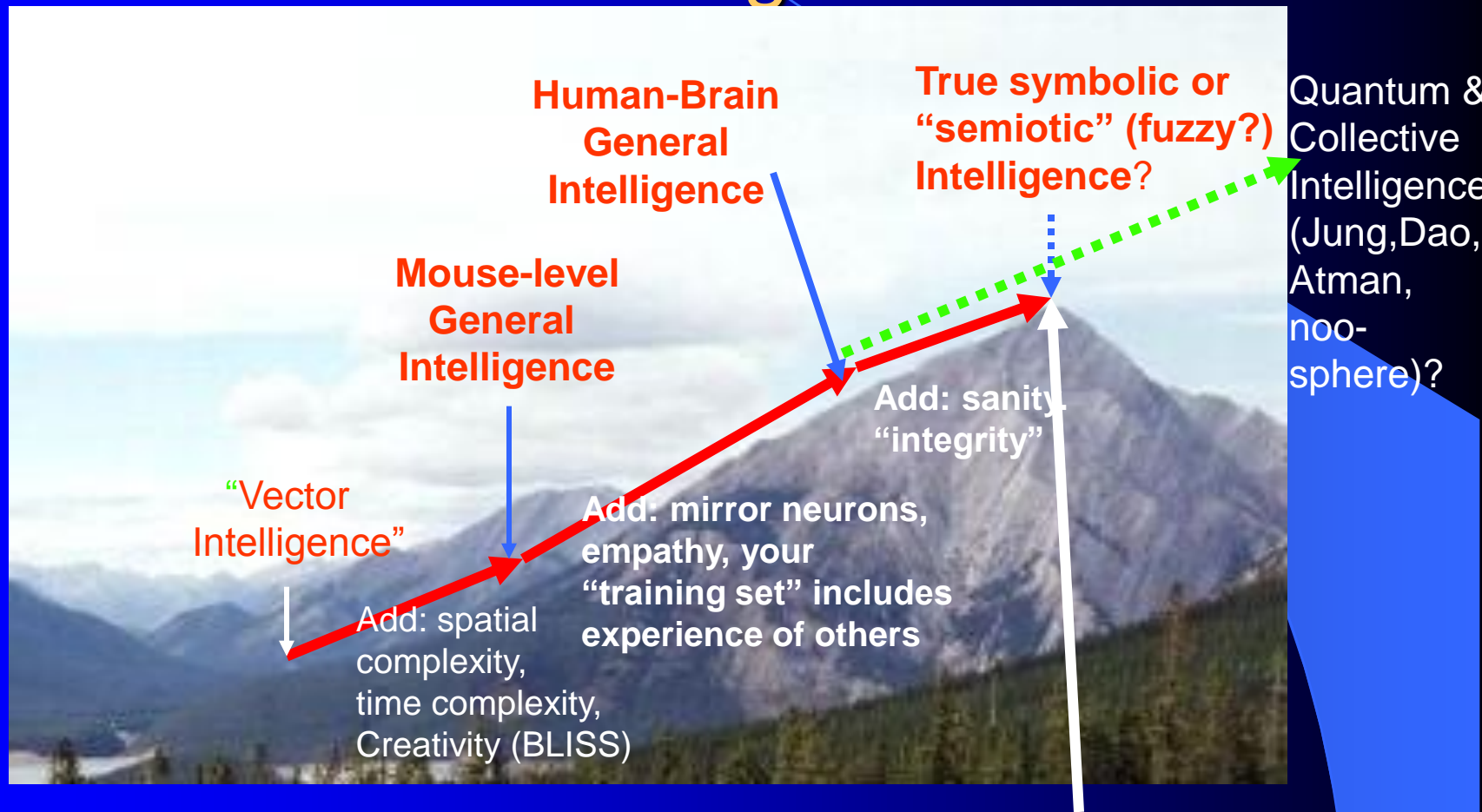
The task: remember Greeley's data, and Build on Teilhard de Chardin

Neural Networks: A New Science

- For my day job, I fund neural networks at the US National Science Foundation, but the views today represent my views, not NSF views.
- Past President of International Neural Network Society. IEEE Fellow and Pioneer Award for original development of two (complementary) types of neural network, the foundation of most of the big applications today.
- We work to build and understand brain-like intelligence, a prerequisite to understanding and scientifically nourishing higher intelligence.



What is the **Fastest and Most Promising** Path to Build and Understand the Highest Level of Intelligence??



For details:
www.werbos.com

Straight Up the Cliff
to “Human-Level” Intelligence?

“Cognitive Optimization and Prediction”, search on “COPN” at www.nsf.gov – and international follow-on?

$$\frac{\Pr(A|B) = \Pr(B|A) \cdot \Pr(A)}{\Pr(B)}$$

Prediction

Memory

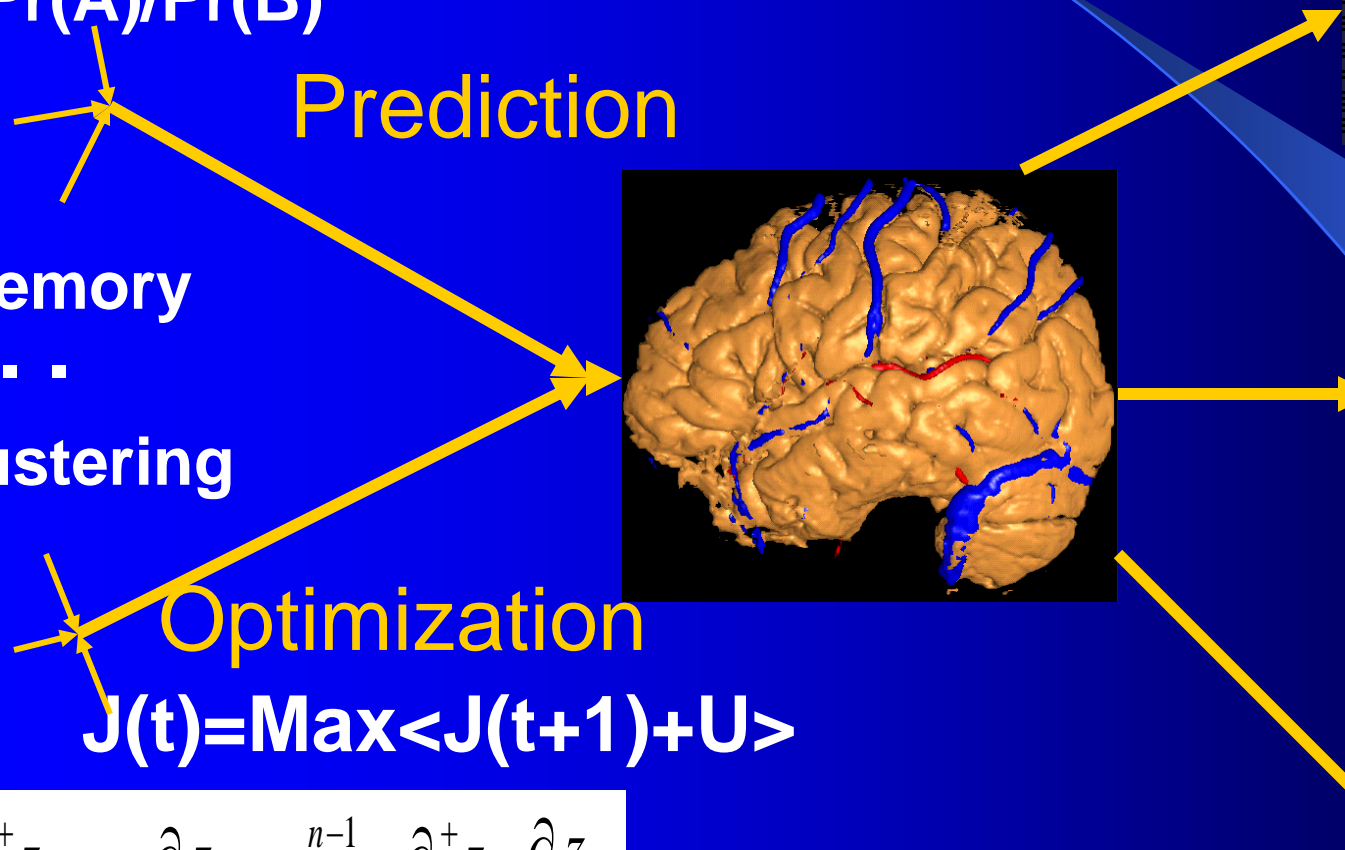
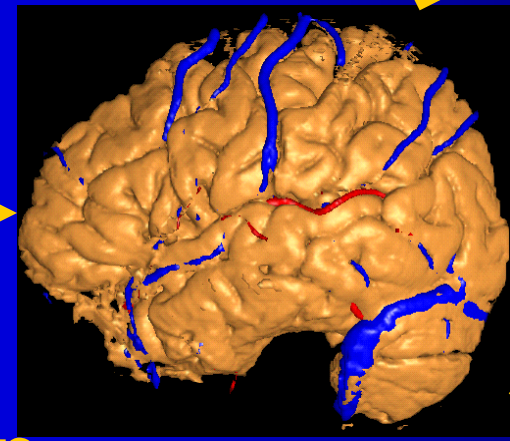
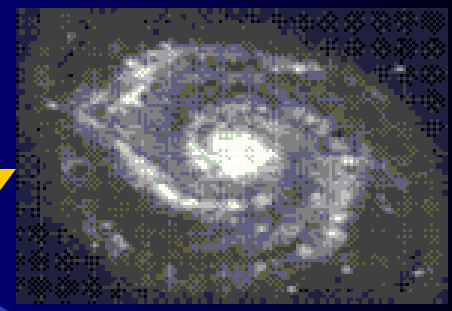
...

Clustering

Optimization

$$J(t) = \text{Max} \langle J(t+1) + U \rangle$$

$$\frac{\partial^+ z_n}{\partial z_i} = \frac{\partial z_n}{\partial z_i} + \sum_{j=i+1}^{n-1} \frac{\partial^+ z_n}{\partial z_j} \frac{\partial z_j}{\partial z_i}$$



Beyond the Individual Human Brain – A Few Quick Thoughts Based on What I Have Seen

- $\partial J / \partial R_i$, a backpropagation signal, represents “how much an increase in R_i makes to happier. It represents the value of R_i to you. It fits Freud’s idea of “psychic energy.” Backpropagation of J derivatives represents a kind of flow of emotional energy in the brain. It drives the learning of all that we do – the basis of human potential.
- Collective intelligence requires similar flows of derivative information between people and connecting to the larger world. Is “qi” or “tao” really just a flow of the same kind of derivative signals in our larger Mind, driving the larger course of our culture and society and world? Is it governed by the same mathematics, the chain rule for ordered derivatives?

The Force be With You!!!

6 MegaChallenges for the 21st Century

- Key Challenges To Basic **Scientific Understanding**:
 - What is **Mind**? (how to build/understand intelligence)
 - Basic Science of Mind: Up To the Highest Kind of General Intelligence We see in the Smallest Mouse
 - Middle Sci. Mind: from Mouse to “Sapient,” the level of full use of symbolic reasoning integrated with meaning/empathy (human brain is “new”, still halfway there in its evolution)
 - Higher Sci. of Mind: Principles of higher levels in intelligent systems design, like quantum, multimodular, soul
 - How does the **Universe work**? (Quantum physics...)
 - What is **Life**? (e.g., quantitative systems biotechnology)
- Key Broader Challenges to **Humanity**:
 - **Sustainable growth** on earth
 - Global sustainable **energy/environment** & mid-term survival
 - “**yin sustainability**,” e.g. population, related women’s issues, peace
 - Cost-effective sustainable **space** settlement
 - Human potential -- growth/learning in brain, soul, integration (body)

