

# Causality, Randomness, Free Will and other tangled matters

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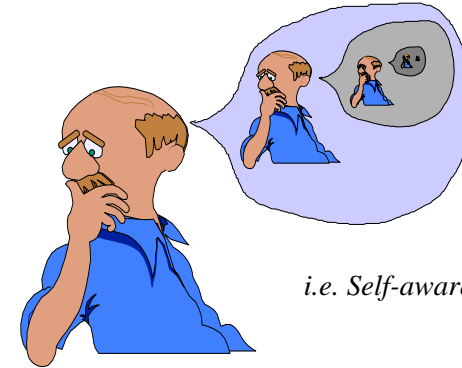
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## Consciousness?



*i.e. Self-awareness*

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## Key Elements of Consciousness

- **Self / Identity** - *My experience*, my internal states, my feelings, my rich inner life, qualia, etc?  
=> Instead, one should be asking “What is *Self*?”
- **Free Will** - Non-determinism, freedom of personal choice  
=> Randomness, causeless events?
- **Conscious functions & phenomena** - emotions, modeling, learning, creativity, Psi, etc

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## Turing Refutes Objections to AI (1950)

1. *The Theological Objection (a Soul)*
2. *The “Heads in the Sand” Objection (Fear)*
3. *The Mathematical Objection (Gödel)*
4. *Argument from Consciousness (Emotions)*
5. *Arguments from Various Disabilities*
6. *Lady Lovelace’s Objection (Originality)*
7. *Argument from Continuity in the Nervous System*
8. *Argument from Informality of Behavior*
9. *Argument from Extra-Sensory Perception*

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## Tangled Matters

- Consciousness
- QMeasurement
- QEntanglement
- Randomness
- Causality
- Psi, anomalies
- Free Will, determinism
- Gödel theorems
- Artificial Intelligence



"Tangle", Martina Nehrling

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## Leaps of Consciousness – Pitfalls ⓧ

- Consciousness phenomena (experience, qualia, etc) are so inexplicable that quantum states must be involved in the brain.
- Consciousness is essential to quantum measurement.
- Consciousness creates reality.
- Conscious phenomena violate physical principles, especially Cause and Effect.
- Gödel's theorems imply that the mind is more than a computer.
- etc, etc.

*"... take experience itself as a fundamental feature of the world, alongside mass, charge, and space-time." – David Chalmers*

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## Varieties of Free Will

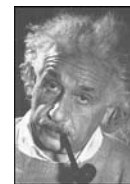
- **Complete determinism** – No choice; All is fixed and determined by the past; Classical physics.
- **Personal control** – Some choice; Actions determined according to one's own wishes & judgment.
- **Complete freedom** – Truly random choice; No influence from the past or externally; Quantum physics.

*"The law of causality, I believe, ... is a relic of a bygone age, surviving, like the monarchy, only because it is erroneously supposed to do no harm."*  
-- Bertrand Russell, 1913

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## Is Nature Probabilistic?

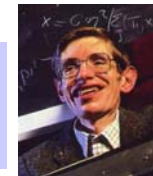


*"[QM] yields much, but it hardly brings us closer to the Old One's secrets. I, in any case, am convinced that He does not play dice."*

– A. Einstein, letter to Max Born, 1924

*"Not only does God definitely play dice, but He sometimes confuses us by throwing them where they can't be seen."*

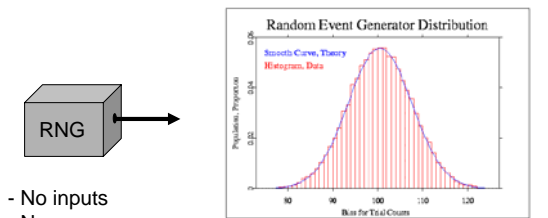
– S. Hawking, 1995



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## Random: Uninfluenceable, Unpredictable



- No inputs
- No memory

Tests: Diehard, NIST, Comscire, etc.

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## Quantum Theory

### Unitary evolution (U)

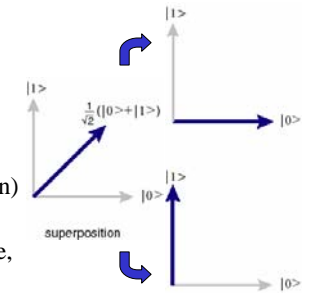
(Schrödinger equation)

linear, unitary, conservative,  
reversible, deterministic

### Measurement (R)

(“collapse” of the wavefunction)

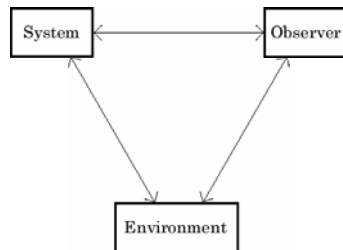
non-linear, non-unitary, non-  
conservative, non-reversible,  
random, unpredictable



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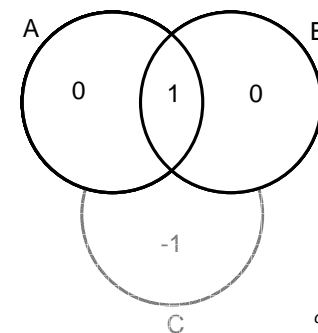
## Measurement Interaction



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## Quantum Entropy & Measurement



$$H_A = H_B = 1$$

$$H_{A|B} = H_{B|A} = 0$$

$$H_{A:B} = 1$$

$$H_{AB} = 1$$

after Cerf & Adami,  
quant-ph/9605002v2, 1997

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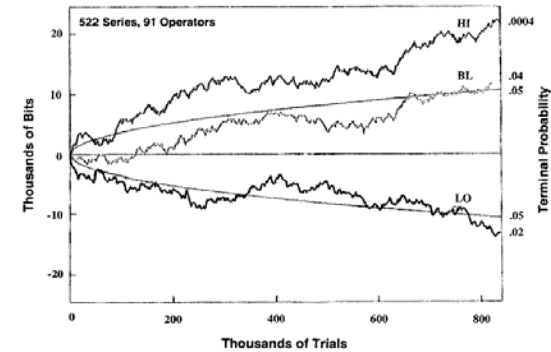
## Summary & Remarks

- All quantum evolution is unitary - *no collapse, no randomness*
- No quantum randomness => *apparent determinism*
- Apparent *Free Will* is due to complexity, large number effects
- Time symmetry – preparation, measurement
- Correlations in present due to interactions in past *or future*
- Measurement *appears* random because of backwards influence
- Cause-and-Effect is *obsolete* => *bidirectional relations*
- (Some) Psi phenomena are explained

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## PEAR RNGs - Conscious Influence?



Jahn & Dunne, *JSE*, Vol 19, No 2, 2005  
[www.princeton.edu/~pear](http://www.princeton.edu/~pear)

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## Global Consciousness Project

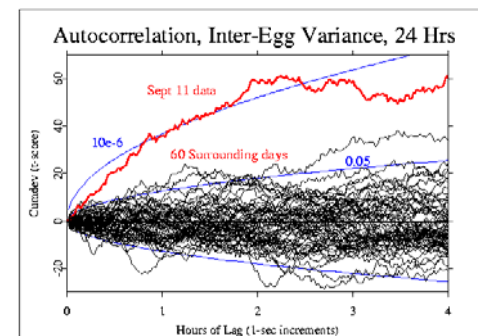


>50 true-random RNGs around the world  
 200 bits / sec / RNG → 864 Mbits / day  
<http://noosphere.princeton.edu>

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## GCP RNGs 9/11 - Correlated Variance

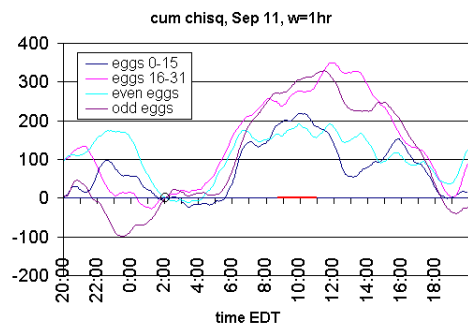


Global Consciousness Project  
<http://noosphere.princeton.edu>

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## GCP RNGs 9/11 - Correlated Variance



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FOUNDATIONS OF PHYSICS LETTERS  
VOL. 15, NO. 6, DECEMBER 2002

### CORRELATIONS OF CONTINUOUS RANDOM DATA WITH MAJOR WORLD EVENTS

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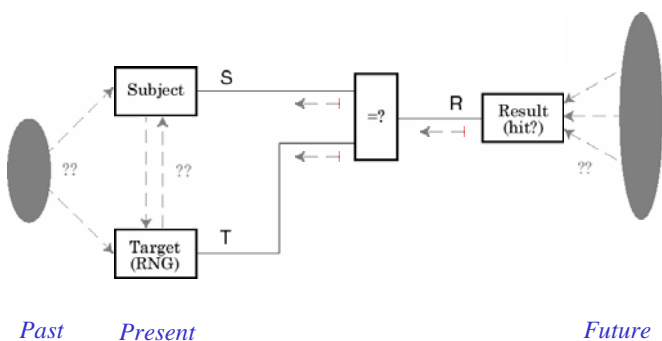
Received 18 July 2002; revised 4 October 2002

The interaction of consciousness and physical systems is most often discussed in theoretical terms, usually with reference to the epistemological and ontological challenges of quantum theory. Less well known is a growing literature reporting experiments that examine the mind-matter relationship empirically. Here we describe data from a global

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## Simple Psi Experiment



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Welcome to the Boundary Institute's on line psi tests



Card Test



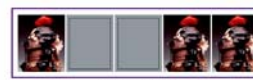
Remote Viewing Test



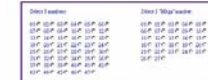
Sequential Card Test



Location Test



Card Draw Test



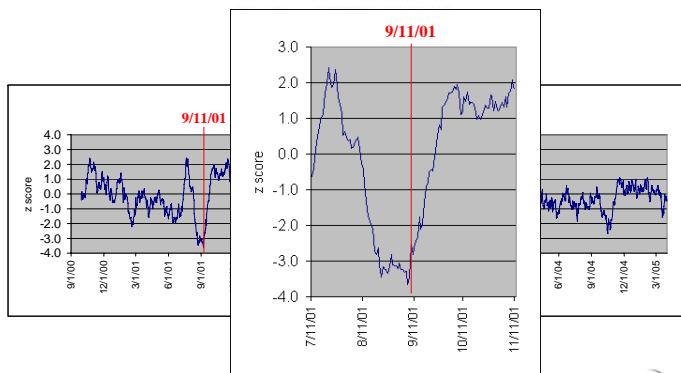
Lottery Test

[www.boundarylab.org](http://www.boundarylab.org)  
[www.gotpsi.org](http://www.gotpsi.org)

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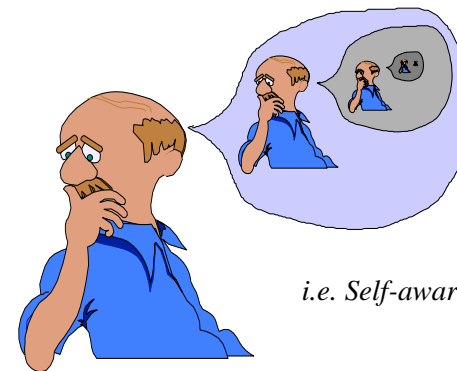
## Card Guessing



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## Consciousness?

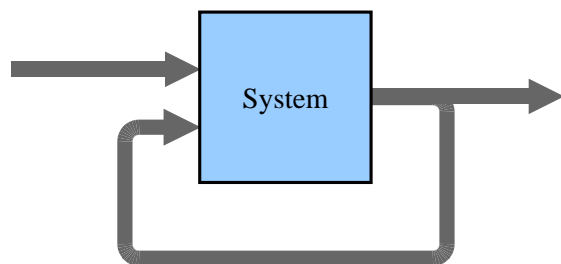


*i.e. Self-awareness?*

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## System with Feedback

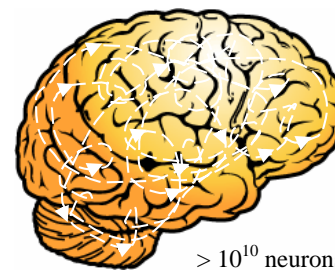


*Self-aware?*

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## System with Complex Self-Reference



*the Self?*

>  $10^{10}$  neurons etc  
> 1000 fan-in/out  
self-reference at all levels  
cell assemblies etc (Hebb)

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## Interesting Consciousness Phenomena

- Psi, including clairvoyance, precognition, telepathy, psychometry, influence on 'random' processes, etc
- Hauntings, ghosts
- Metal bending
- Intentional healing, etc
- Reincarnation phenomena
- Near-death & out-of-body experiences
- etc

... *may be real; serious investigation required ...*

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## Progress of Science – I

- Deeper, simpler principles (unification)
  - Pantheon of gods, myriad of rules
  - Ptolemaic cycles => Copernican helios
  - Relativity: Matter & Energy
  - Gravity & Accelerated motion
  - Atomic theory => Standard Model
  - U & R processes => U (no “collapse”)
  - ...
  - Distinctions (Laws of Form)

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## Progress of Science – II

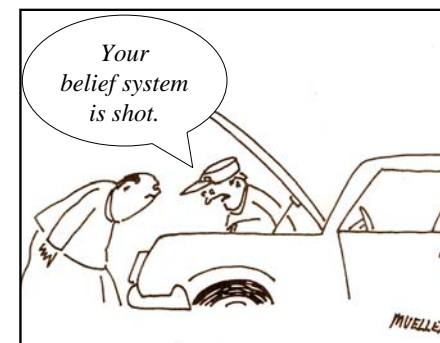
- Relinquishing “specialness” (humility)
  - Earth is not special (Copernicus)
  - Elements are not special (atomic theory)
  - Motion is not special (relativity)
  - Life is not special (contra vitalism)
  - ...
  - *I am (Self) is not special*

*“The most important scientific revolutions all include, as their only common feature, the dethronement of human arrogance from one pedestal after another of previous convictions about our centrality in the cosmos.” -- Stephen Jay Gould*

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## Progress is Difficult



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