Starting Science From God
2: Discrete Degrees

Ian Thompson
Visiting Professor of Physics, University of Surrey, England
Currently employed at Lawrence Livermore National Laboratory.
www.ianthompson.org

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A series of four evenings

- Feb 5: Connecting Science and Theism (chs. 1, 3)
- Feb 12: Discrete Degrees (chs. 4, 5)
- Feb 19: Explaining Theism (Part III)
- Feb 26: Applications to Theistic Science (Part V)

- I talk for 45 mins (answering shorter questions).
- Refreshment break for 15 mins
- Discussion for 45 mins (for longer questions)

2. Discrete Degrees

OUTLINE

Better idea of ‘substance’?
- Realistic basis need for all kinds of things
- The power/propriety/dispositions of objects
- Concept of mental substance

Better idea of ‘multiple degrees’ of existence?
- Like ‘dimensions’ or ‘planes’, but better
- Examples from physics
- Examples from psychology
- General principles: generation & selection
- See connections between levels

Both ideas came from using Swedenborg to understand modern science!

Particular conclusions to remember: see the sign

A. Bad ideas of mental substance

- Matter (materialists, physicalists)
- Rationality (Descartes)
- Immaterial Form (Aquinas)
- Information (Bohm?)
- Pure Being (nondualists)
- Quantum vacuum (Laszlo)
- Consciousness (what does it do?)

Substance, Form, and Dynamics

Back to basic analysis:
- There are three categories of terms in science:
  - formal terms
    - about the structure & static properties of what exists
  - existential terms
    - about what exists, what is. Is it unknown?
  - dynamical terms
    - about what would happen, in new and/or hypothetical conditions.
    - Only by dynamics, can we make predictions.

MATHEMATICS
- shape, number, form, relation, configuration,
- function, field, oscillation, wave, flow, vibration
- point, length, area, volume, amplitude, vector, matrix, Hilbert space
- ratio, probability, relative frequency

PHYSICS
- cause, propensity, power, disposition, capability,
- energy (kinetic and potential), mass, charge, field coupling, force, pressure, momentum, inertia, elasticity/rigidity

All three categories are needed, in order to describe:
What exists, its Form and its Behavior.
Three Categories: more examples

<table>
<thead>
<tr>
<th>Form</th>
<th>Existence</th>
<th>Dynamics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. shape, number, form, relation, configuration, 2. function, field, oscillation, wave, frequency, 3. point, length, area, volume, amplitude, 4. vector, matrix, operator, Hilbert space, 5. ratio, probability, relative frequency.</td>
<td>1. particle, material, matter, corpuscles, body, 2. field, ether, nature, actuality, reality, 3. mass, charge, field coupling, 4. force, pressure, 5. momentum, impulse, elasticity, gravity.</td>
<td>1. cause, propensity, power, disposition, capability, 2. energy, kinetic and potential, actuality, possibility, 3. mass, charge, field coupling, 4. force, pressure, 5. momentum, impulse, elasticity, gravity.</td>
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</tbody>
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All three categories are needed, in order to describe: What exists, Its Form and Its Behavior.

New idea: ‘Dynamic substance’

- Try to derive ‘existence’ from ‘dynamics’.
- Substance of a thing is its propensity (to do something).

Examples:
- ‘electromagnetic force field’.
- ‘potential energy field’.
- ‘matter is a form of energy’.
- Quantum wave function is a ‘propensity field’.
- Propensity is a vector or a propensity is Born’s actual outcome.
- Remember: propensities still present even if not acting.
  - Do not need to know more ‘existence’ than this.
  - Maybe not that original.
  - Aristotle and Newton used something similar.

Mental Substances (minds)

Works for minds too:
- Not something ‘we know not what’.
- Mental substances are the propensity for mental actions.
- That is: loves, desires, etc. are mental substance.

- Even materialists (eg Gilbert Ryle) agree that ‘minds are dispositions’.
- But now we take them as real substances.
- Agrees with Swedenborg that ‘Love is the substance of man’.

DL/WW: “Divine Love and Divine Wisdom in themselves are substance and form”

Bad ideas of mental substance

- Immaterial Form (Aquinas)
- Rationality (Descartes)
- Matter (materialists, physicalists)
- Information (Bohm?)
- Quantum vacuum (Laszlo)
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Why?

Quantum Physics

- There are probabilistic (random) events.
  - From a wave function spread out in space
  - Wave function from an equation about energy

Now:
- The wave function is the form of propensity.
  - The propensity for probabilistic events.
  - That propensity is substance of quantum objects.
- No particles, only ‘waves of propensity’.
- The propensity is the substance, wave is the form.

Two stages in Quantum Mechanics

- Active Energy (Hamiltonian Operator)
- Propensity Wave (Wave function)
- Actual Outcome (Measurement)

1. Propensity wave generates the actual measurement according to Born’s Probability Rule for |ψ⟩.
2. Actual measurements = selections of alternate histories.
3. Energy operator generates the wave function, according to Schrödinger’s time-dependent equation.
5. Neither are mental propensities!
Bad ideas about Quantum Physics

- Shut up and calculate (physicists)
  - No reality
- Physics just for actual outcomes, not reality (Bohr)
  - No propensity or substance
- Parallel universes (Everitt)
  - No actual outcomes
- Hidden classical particles (Bohm)
  - Quantum waves are not substances
- Selection by consciousness (Wigner)
  - Propensities are for selections. But maybe ‘when’?

B. Multiple ‘degrees’ of existence

- Show new concept for how minds and matter are (a) separate and (b) interrelated!
- Later: use concept to show how God and creation are (a) separate and (b) interrelated!
- This idea comes from Swedenborg
  - New illustrations from physics & psychology

How Mind and Matter related?

1. Matter causes mind only? matter\rightarrow mind
   - Epiphenomenalism or dual-aspect physicalism
2. Mind causes matter only? mind\rightarrow matter
   - ‘new age’ or ‘we create our own reality’
3. Mind and matter in parallel? mind\leftrightarrow matter
   - Pre-established harmony: Leibniz. Correspondences?
4. Mind and matter interact minds* matter
   - Descartes (Body ↔ Soul)
   - Causes in both directions, but not in same way
   - Swedenborg (many discrete degrees)

Degrees in Galileo’s experiment

Remember how a ball rolling down a hill is accelerated by gravity (Galileo’s experiment)
Newton’s second law: F=ma
- So: acceleration (a) = force (F) / mass (m)
- But: acceleration is present only if mass is there!
- So: force = disposition to accelerate a mass
  - if finite mass present
- Presence of inertial mass is occasion for motion, but not principal cause

Multiple degrees in Newton’s physics

- Ball rolling down a hill is accelerated by gravity
- Gravitational energy:
  - Force depends on the slope
  - Changes in gravitational potential energy produce the force

- Acceleration

Potential energy (Gravitational energy) (Forces add) Acceleration
Newton's Law of Gravity Newton's Second Law F=ma

Again, we see two stages of the operation of propensities.

Multiple degrees in psychology

- In deliberate control of hand movements
  1. Deliberate (rational) intentions (D)
  2. Monitoring of moving hand, by eyes (P)
  3. Control of muscles (M)

Psychologists make theories about:
“Cascading Inten+ons” D \rightarrow P \rightarrow M \rightarrow overt action
Recognizing Discrete Degrees

- Quantum mechanics:
  - Energy → Propensity → Actual Selections
- Classical physics
  - Potential energy → Forces → Acceleration
- Psychology of motor control
  - Plan → Guidance → Motor impulse → Physical act
- All these are example of Discrete Degrees

Principles of 2 Discrete Degrees

Consider: A → B
- A generates further existence of B, and B is selected by previous A
- Which new B is generated by A, and is selected by previous B
- Twin processes of generation and selection:
  - Generation is from the 'higher' degree: 'principal cause'
  - Selection is from the 'lower' degree: 'occasional cause'
- With only two degrees like here, we have 'occasionalism'
- For God, this is philosophy of Nicolas Malebranche (1638-1715)
- An attempt to understand God-world relations.

Principles of 3 Discrete Degrees

Consider: A → B → C
- A generates further existence of B, and B of C
- Which new B is generated selected by previous A
- Which new C is generated selected by previous C

Examples of 3 Discrete Degrees

Have from quantum physics
- A: principle / energy
- B: distribution / form
- C: final effect

Just like in the mind:
- A: desire
- B: thinking
- C: action

Each degree has
- own being
- own space
- own existence

Quantum Field Theory: Propensities for Virtual Processes

- TWO linked sets each of three generative levels
  - both with (broadly) corresponding processes,
  - i.e. still in pattern 'Energy → Wave → Effect'.
- Virtual processes in some way 'generate' the terms of the Energy Operator: the Hamiltonian. (Kinetic & Potential E)

Preview of Third Talk (Feb 19)

- Good concepts of God
  - Not metaphorical, or hidden from science
  - Being itself, Life itself, Love itself, Wisdom itself
- Understanding how we derive from God
  - God is being, love, wisdom & life itself
  - We derive being, love, wisdom, life from God
  - How?
  - By 'generation and selection', in discrete degrees