Critical Thinking

Capstone Perspective

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Ask Questions
You might find answers
Why?

Why is it that, out of all the mammals, we don’t have hair-covered bodies? What is the advantage re: natural selection that makes it better to give up your protection from sun/weather/insects/etc?

Each of the four species of ape (our closest relatives: chimpanzee, gorilla, bonobo, and orangutan) has 24 chromosome pairs. Why do we have 23?
Why?

Why (and how) did civilization suddenly spring into existence 10–15,000 years ago?

• domesticated animals
• domesticated plants
• bicameral government
• standing armies
• 100 recipes for making beer
The Ziggurat at Ur (Sumer)
Speaking of Sumer, what’s this?

& why does every culture have a flood myth?
Speaking of domesticated animals, how does one “domesticate oneself” (it is accepted wisdom that humans “domesticated themselves”)?

Why are NASA’s modern cameras just as bad as (and sometimes worse than) the ones from the 1970s?

Why would you choose to build and live in a lean-to if you could build a house?
Why do pyramids appear all over the world? Are they a natural phenomenon? **Africa**
Central America
Critical

Thinking

Bruce Jacob

University of Maryland

SLIDE

China
Europe (Bosnia)
North America ("mounds")
South America
Russia?
Australia?
Antarctica?
Why is this called “natural” ??
(history is wrong)
Why do we call these Maxwell’s equations, when they are Heaviside’s formulation?

<table>
<thead>
<tr>
<th>Name</th>
<th>Integral equations</th>
<th>Differential equations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gauss's law</td>
<td>$\iiint_{\partial\Omega} \mathbf{E} \cdot d\mathbf{S} = \frac{1}{\varepsilon_0} \iiint_{\Omega} \rho , dV$</td>
<td>$\nabla \cdot \mathbf{E} = \frac{\rho}{\varepsilon_0}$</td>
</tr>
<tr>
<td>Gauss's law for magnetism</td>
<td>$\iiint_{\partial\Omega} \mathbf{B} \cdot d\mathbf{S} = 0$</td>
<td>$\nabla \cdot \mathbf{B} = 0$</td>
</tr>
<tr>
<td>Maxwell–Faraday equation</td>
<td>$\oint_{\partial\Sigma} \mathbf{E} \cdot d\mathbf{l} = -\frac{d}{dt} \iint_{\Sigma} \mathbf{B} \cdot d\mathbf{S}$</td>
<td>$\nabla \times \mathbf{E} = -\frac{\partial \mathbf{B}}{\partial t}$</td>
</tr>
<tr>
<td>(Faraday's law of induction)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ampère's circuital law (with</td>
<td>$\oint_{\partial\Sigma} \mathbf{B} \cdot d\mathbf{l} =$</td>
<td>$\nabla \times \mathbf{B} = \mu_0 \left( \mathbf{J} + \varepsilon_0 \frac{\partial \mathbf{E}}{\partial t} \right)$</td>
</tr>
<tr>
<td>Maxwell's addition)</td>
<td>$\mu_0 \left( \iint_{\Sigma} \mathbf{J} \cdot d\mathbf{S} + \varepsilon_0 \frac{d}{dt} \iint_{\Sigma} \mathbf{E} \cdot d\mathbf{S} \right)$</td>
<td></td>
</tr>
</tbody>
</table>
Why does this happen?


Physicists spooked by faster-than-light information transfer

Quantum weirdness even stranger than previously thought.

Geoff Brumfiel

Two photons can be connected in a way that seems to defy the very nature of space and time, yet still obeys the laws of quantum mechanics.

Physicists at the University of Geneva achieved the weird result by creating a pair of 'entangled' photons, separating them, then sending them down a fibre optic cable to the Swiss villages of Satigny and Jussy, some 18 kilometres apart.

The researchers found that when each photon reached
Why does this happen?
Why does this happen?

(physics is wrong)
Other Questions

What is the deal with capitalism vs. communism/socialism, and why is everyone so upset about it?

What is the deal with gun control, and why is everyone so upset about it?

What is the deal with immigration (legal and otherwise), and why is everyone so upset about it?
Other Questions

What is the deal with the First Amendment, and why is everyone so upset about it?

What is the deal with GMOs, and why is everyone so upset about them?

Does God/Allah/Brahma, Vishnu, Shiva/*.* exist? Do gods exist?

What is the meaning of life?
Reasoning From First Principles

Some things need no experimentation and can be arrived at through simple logic and deduction ...
Capitalism vs. Socialism

New grading system for this semester
<table>
<thead>
<tr>
<th>Capitalism</th>
<th>Socialism</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Summary</strong></td>
<td>Everyone gets an equal share</td>
</tr>
<tr>
<td><strong>Carrots &amp; Sticks for Individuals</strong></td>
<td></td>
</tr>
<tr>
<td>You keep what you make</td>
<td>Everyone gets an equal share</td>
</tr>
<tr>
<td>Positive pressure: do more, create more, achieve more, produce more</td>
<td>Positive pressure: consume more and do less</td>
</tr>
<tr>
<td>(increases your direct reward: the harder you work, the more you get)</td>
<td>(this increases the reward/effort ratio, which is even stronger positive feedback than capitalism’s increase on reward)</td>
</tr>
<tr>
<td>Negative pressure: guilt over one’s success</td>
<td>Negative pressure: only external (e.g., violence)</td>
</tr>
<tr>
<td><strong>Result at Societal Level</strong></td>
<td></td>
</tr>
<tr>
<td>Highly productive society; jobs created for others when you cannot produce</td>
<td>Without force, highly unproductive society; jobs tend to be created only</td>
</tr>
<tr>
<td>enough on your own and need to hire help; plenty exists</td>
<td>by the government; plenty does not exist (again, without force)</td>
</tr>
<tr>
<td><strong>Increase Soc Productivity?</strong></td>
<td></td>
</tr>
<tr>
<td>Decrease corporate tax rate (increases investment &amp; hiring)</td>
<td>Use of force</td>
</tr>
<tr>
<td><strong>Weaknesses</strong></td>
<td></td>
</tr>
<tr>
<td>Societal guilt over individual success can be used to manipulate</td>
<td>Violence has been required in every instance socialism was attempted;</td>
</tr>
<tr>
<td>individuals and, through them, the entire system</td>
<td>socialism killed well over 100M people in the last century</td>
</tr>
</tbody>
</table>
(popular logic is wrong)
Ask Questions
You might find answers
Questions?
(thanks for humoring me)

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