Big-question science

Science writers continue to address Leibniz's enduring question: why is there something rather than nothing? Popular new books on the topic include Why Does the World Exist? (Jim Holt) and A Universe From Nothing (Lawrence Krauss). These titles appeal to big-question thinkers who, like Brian Greene, remain peculiarly susceptible to a curious strain of insomnia (*New Scientist*, 5 Feb 2011):

> NS: Is there any question that keeps you up at night?
>
> BG: I wish it was just one. There are two that, if I allow myself to think about them, make my heart sink. Why is there something rather than nothing? It's a simple question that's been asked for so long and the idea of nothing seems to me logically sensible. But when I truly imagine nothingness, well, I find it almost scary. Why *isn't* there nothing?
> The other question is the nature of time. Time is with us ... but what is time?

Nobel scientist Frank Wilczek makes a similar comparison (PI lecture, 19 Jul 2008):

> The most profound lesson of quantum field theory, to me, is that what appears to us as empty space is in reality a wildly dynamical medium. Empty space is not nothing.

Further investigation into the science of such statements reveals a fundamental controversy: what is the definition of nothing? In the interest of consistency among science writers, this controversy can be resolved, without paradox. For example (identifying synonyms):

> By any consistent definition, the annihilation of *everything* would be nothing.

In terms of what we *predict* and *observe*, this definition is far more practical in debate than some might expect. The most popular equation in science, for example, can be expressed: $m = E/c^2$, or even, c = square-root(E/m). These synonymous equations identify the speed of light (c) as being *square-root-functional*. They also identify what is *conserved* rather than annihilated. It follows that, by any consistent definition, a theory of nothing is comfortably within the scope of mathematical science.

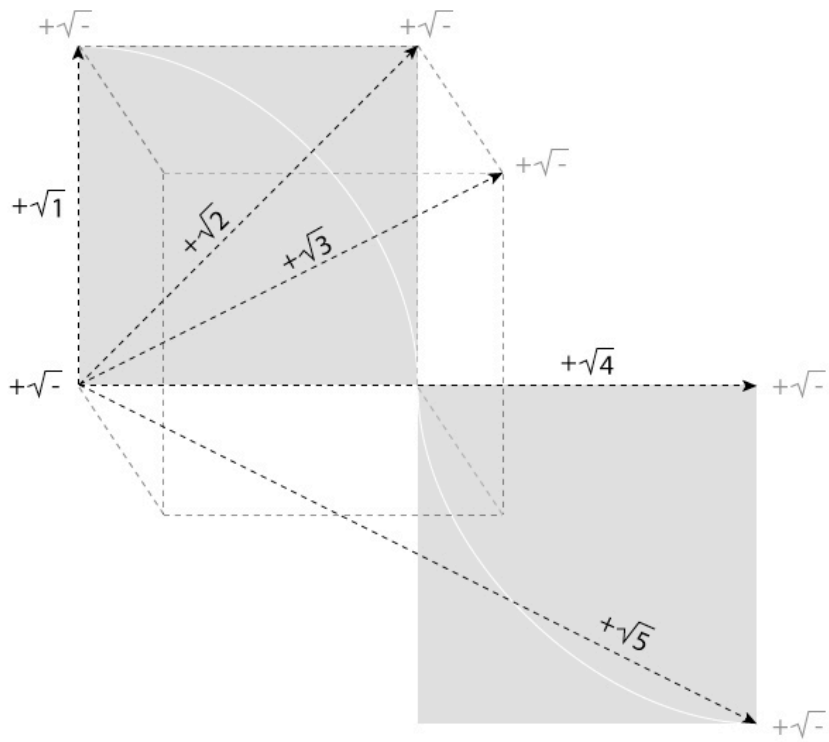
More specifically: any complete model of "square-root-functionality" must include both *irrational* and *imaginary numbers* (e.g. $\sqrt{2}$, $\sqrt{-1}$). Given the equation for mass-energy equivalence, any astute mathematician can easily model the probability of annihilation in terms of the square-root function. For example (using abbreviations):

> (-): annihilated (none)
>
> (+): *conserved* (*singular*)
>
> (±) or (√): *multiplication and division* (*plural*)

Synonymously (in general and in every detail): one thing is not another. As Georg Cantor showed in terms of the infinite, this statement is *always provable*.

Proof (*without paradox*):

(+): (+1) < (+2) < (+3) < (+4) < (+any *additional integer*).



This is an illustration of square-root-functionality, beginning at any point.

(+1) *consists of* any *additional* (+) *distance* (√1). Its *diagonal* is (+2).

(+2) *consists of* any (+) *distance* (√2). Its *diagonal* is (+4).

(+3) *consists of* any (+) *distance* (√3). Its *diagonal* is (+9).

(+4) *consists of* any (+) *distance* (√4). Its *diagonal* is (+16). Its *radial* is (+1).

These functional "dimensions" are easily demonstrated using sheets of graph paper. The squares of any sheet (+1) will occur as *diagonal* to the squares of any sheet (+2). Likewise, the squares of any sheet (+3) will occur as *diagonal* to any sheets (+1) *and* (+2). Any additional sheet (+4) will *coincide* with (+1) at alternating *points* (*in correlation*, *as immediate to* any *prior division*). That is: *diameter before radii*; *circumference before origin; numerator before denominator*. Or (one rule): For any something (like *space*) to be divided, it must first *exist* (*by multiplication*, *as between points*).

In other words (*theory*): *the observable universe extends by multiplication* (i.e., any $\pm c^2$):

(+): (+1) < (+2) < (+any *additional space, as remains immediate to* any *prior division*).

As illustrated, this is an "additional distance" number line. In comparison to any "zero-origin" number line, it *excludes* zero and negative numbers. How?

Imaginary numbers

An "imaginary number" is the positive square root of a negative number: $(+\sqrt{-})$. The practical difference between "additional distance" number lines and "zero-origin" number lines is in how imaginary numbers are factored:

"Zero-origin" number lines: $+(\sqrt{-c})^2 = (-c)$. For example: $(+\sqrt{-1})^2 = (-1)$.

← -3 -2 -1 0 +1 +2 +3 →

"*Additional distance*" number lines: $+(\sqrt{-c})^2 = +(\sqrt{+c})$. For example: $+(\sqrt{-1})^2 = +(\sqrt{+1})$.

Imaginary numbers can be factored from any *additional distance* (*as between points*):

(+): (+1) < (+2) < (+3) < (+any *additional integer*).

In other words (as what is *conserved* remains *possible*):

It remains *possible* (+) *to predict* (√) what is not possible (-) at any *point*: $(+\sqrt{-})$.

Scientific methods

Or, accounting for any *additional evidence* (*in common, as between points*):

(*evidence*): The annihilation of *everything* has been predicted (*as between observations*) but it has never been *observed* (*as between predictions*): one thing is not another.

By "adding nothing" to what is *evident* we can also account for *false predictions*. In response to Leibniz's question:

Why is there something rather than nothing?

Because everything has yet to be annihilated.

This answer invites experimental verification in terms of any *possible units* (*in correlation*, as what is not possible cannot *predict* itself):

(*prediction*): What is not possible (-) will not occur at any *point* $(+\sqrt{-})$.

(*observation*): Any *point is not a line* (*as between points*), any *line is not an area* (*as between lines*), any *area is not a volume* (*as between areas*), any *volume is not a field* (*as between volumes*), any *field is not all of possibility* (*as between fields*) *and all of possibility* (*as observed*) *is not* (as predicted) impossible: *one possibility* (+) *is not* another (-).

Or, abbreviating (however it might be expressed):

(*evidence*): None can be excluded; $c = \sqrt{(E/m)}$.