

Scientists Confirm Euler's Identity is Math's Most Beautiful Expression

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Cover Page Footnote

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Scientists Confirm Euler's Identity

$$e^{i\pi} + 1 = 0$$

is Math's Most Beautiful Expression

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Zeki, Semir, John Paul Romaya, Dionigi M. T. Benincasa, and Michael F. Atoyah. "The experience of mathematical beauty and its neural correlates." *Frontiers in Human Neuroscience*, **8**, February 13, 2014. <http://journal.frontiersin.org/article/10.3389/fnhum.2014.00068/full>

A Magic Mirror on the wall they didn't have, so instead
an MRI machine was used to look not at the faces
but the brains of 15 volunteers who certified they'd learned,
in life, a thing or two about the art of mathematics.
And sure enough, when shown
mathematical expressions from a list of such, ones
the volunteers had earlier—each
on their own—declared to be for him or her
(a) *beautiful*,
(b) *just so-so*,
or (c) *down-right ugly*
their brains did light up more consistently for (a)
than for either (b) or (c), and in the very place where brains
are known to glow when hearing Bach
or looking at a Claude Monet.

But it's a little disappointing—isn't it?—
that among the beautifuls, the most beautiful
was decided by a simple pen-and-paper ranking and not,
as we might have hoped, by a majority
of those 15 brains glowing ever brighter, some maybe even
bursting into flame at the sight of 1
plus e raised to the imaginary-i-times- π adding up
to nothing, naught, and zero.
Yet now, at least, with that box checked,
we can turn our brains to other work.

... Except... except...

that haiku-like arrangement of nothing less
(and nothing more!) than five
of our most cherished fundamental numbers—the glimpse
it gives of mathematic revelation—
they never say, Zeki, S. *et al.*, exactly why that's beautiful.
But one thing's certain: in math, though not sufficient,
truth's a requisite for beauty. Go ahead,
be experimental, try it out, make it false: replace the zero
with $\sqrt{2}$, or change the 1 to ϕ , two other
of our cherished fundamental numbers, and poof!—
you felt it, right?—that glow inside your skull
went out.

The identity has Euler's name attached

yet no one seems to know just where, in all his work,
he wrote it down. That Roger Cotes
did write it down when Euler was a child changes little—
the expression's truth and beauty
would've been the same no matter who unearthed it,
unlike, say, what would've happened
if you or I or even Edgar Allen Poe had written Melville's
Moby Dick.
And what about *The Starry Night*?—was it, for over 40,000 years,
since those first paintings
in the caves of Sulawesi, just sitting there like buried treasure
waiting to be found?
Which, as we know, it finally was,
in 1889, by a harrowed man in an asylum
in the countryside of France,
near the ancient town of Saint-Rémy-de-Provence.