

# Descartes' Carton—*On Plausibility*

| David L. Katz, MD, MPH |

**M**odern healthcare operates under the banner of “evidence-based” medicine. The pursuit of such evidence, however, is not exclusively driven by need, but by the availability of funds, which in turn depends partly on the likelihood of profit. More portentously, the pursuit of data is bounded by the prevailing conceptions of biological plausibility. This essay makes the case that such borders are not readily defined and challenges policy makers and practitioners with this question: In which direction lies the greater risk of miscarriage for legitimate scientific inquiry and the promise of improving the human condition—in the belief that something works whether or not it’s plausible, or in the conviction that something is implausible whether or not it works?

In February 2009, the Institute of Medicine (IOM) convened the Summit on Integrative Medicine and the Health of the Public in Washington, DC.<sup>1</sup> Proponents of *integrative medicine*—the blending of conventional medical practices with those of complementary and alternative medicine (CAM)<sup>2</sup>—assembled in attentive celebration. Detractors convened, albeit less ostentatiously, to express their disapprobation and disdain.<sup>3</sup>

Their disapprobation is borne of a lesser charge, the disdain of a greater one. But both impugn the link between the august imprimatur of the IOM and alleged proponents of integrative medicine. The lesser charge is that CAM lacks substantiating evidence, and although legitimate in patches, it has been rebutted elsewhere<sup>4</sup> and need not concern us here. The concern is the greater charge. Much of what is espoused to fall within the purview of integrative medicine, such as therapeutic touch and homeopathy, is—so goes the indictment—implausible.

My argument here is that this derision is misguided. If the mission is to overcome misguidance, we should begin with my suitability as guide. But I cannot convincingly defend my suitability. I cannot even persuasively contend that I am plausible. And that is the beating heart of this argument.

I am made up of cells; my cells are made in turn of molecules; my molecules of atoms; my atoms of subatomic particles—protons, neutrons, and electrons. Alternative assembly of this same list of construction materials results in the rampant variations of our reality: people and pine trees, penguins and pagodas. All composed of the same elemental stuff, arranged differently.

That people and pine trees are, in their indivisible components, the same is the least of the implausibilities by which our existence is encumbered. We know atoms to be tiny, dense nuclei shrouded by far tinier electrons spinning at ludicrous speeds and, relative to the substance of atoms, vast distances. Each atom, therefore, is overwhelmingly empty space. By any reasonable calculation, the stuff of which we are fashioned is itself fashioned largely of nothing.

Our solar system, an example of spatial relations more accessible to our senses,<sup>5</sup> provides perspective. The diameter of the Sun, the largest item in our solar system at some 870,000 miles, is roughly 1/4000th the solar system’s expanse. Mercury orbits the Sun at an approximate distance of 36 million miles, just over 40 times the Sun’s diameter. The full reach of the solar system from the Sun to Pluto’s orbit, leaving aside the cosmic dust that may be held by solar gravity at considerably greater distance still, is roughly 3.7 billion miles.

In contrast, the distance between an atomic nucleus and the innermost orbiting electron is figured at approximately 5,000 times the nuclear diameter. That nu-

clear diameter is roughly 1/100,000th the expanse of the atom. Thus, the ratio of empty space to matter within an atom is greater than that of the solar system by some two orders of magnitude. The earth’s orbit around the Sun involves less emptiness than each of the atoms that makes up our apparent mass. Thus, we may avow that we are all “hollow men”<sup>6</sup> to our very pith and marrow.

This is undisputed fact. But it is a dizzying fact that subtends consternation more readily than comprehension, for it infuses the most mundane of realities with intimidating wonder.

We shake hands, and putatively, the solid substance of my hand clasps the solid substance of yours. I place the cool diaphragm of my stethoscope against the chest of my patient and am halted there by an undeniable barrier of flesh. I embrace my child, hug my wife.

But there is no solid substance to my hand or yours. My stethoscope and the chill it imparts are no less fenestrated than my patient’s chest. My wife, my children, and I are merely separate spans of empty electromagnetic mayhem.

Electromagnetic we are, ipso facto, from the crudest connection of our most basic biological dots. The gyrations of our atoms produce magnetic fields as do the gyrations of the planets. Were we not magnetic, the vivid imagery magnetic resonance imaging produces of our inner workings could not be. That we are electric, maintaining a charge across our cell membranes, has been known for longer and is the basis for such fundamentals as the pacing of our hearts and the signaling of our nervous systems that tells me I am writing, and you that you are reading.

And so it is amidst electricity and magnetism and vast empty spaces that we turn to reflections on plausibility. Which of these is less likely? Two electromagnetic

---

entities composed mostly of open spaces, assembled by frantically kinetic parts, communicating energetically as they approximate one another while some separation remains. Or . . . my hand, relying on sensory neurons made mostly of the emptiness of atoms, touches your hand, also made of mostly nothing, and receives corroboration from my similarly immaterial brain that we have touched while our eyes—composed of the same finite set of mad gyrations through emptiness—capture waves of light derived from much the same next to nothing and affirm it to be so.

Many energy therapies are considered implausible because they profess an effect of proximity rather than actual contact. Therapeutic touch, for instance, involves no touching. Homeopathy, which asks us to believe that water recalls the molecules with which it has formerly tumbled, is denounced as implausible to the limits of silliness.

I would not deny the implausibility of the therapeutic influence from not touching, nor contest the improbability of healing messages left behind by molecules diluted out of solution. But once we acknowledge that little could be more unlikely or wondrously implausible than a handshake, the topic of plausibility must be broached with greater purpose. I don't understand homeopathy, or believe in it per se. I find it inexplicable and far-fetched, but perhaps slightly less so than the experience of a caress, and incalculably less so than our existence.

We are. Therefore, I think, we must be plausible. But frankly, I don't see how.

And so I am, among other things, a reluctant practitioner of integrative medicine, recognized as such as evidenced by my invitation to speak at the IOM summit with which we began. My reluctance is not borne of shame; I would not do what I found shameful. Indeed, I generally—and hope always—do what I know to be right rather than seek the commendation of people I deem to be wrong. My reluctance in this instance is borne of a lack of

choices. I practice integrative medicine because the needs of my patients pushed me there.

That some dismiss the whole domain on the basis of inadequate evidence is, as implied above, a misunderstanding of the spectrum of evidence and its application to patient care. But the allegation of implausibility rattles at the very foundations of both perception and understanding, and cannot be dismissed out of hand.

So let us agree: we do not sanction vacuous belief, predicated upon hope. There is no haven for such in science, other than in hypotheses, subject to the rigors of testing.

But what of dedicated disbelief, predicated upon presumption? In which direction lies the greater risk of miscarriage for legitimate scientific inquiry and its promise of illumination—in the fatuous belief that something works whether or not it's plausible, or in the intractable conviction that something is implausible whether or not it works?

We cannot abandon all borders of plausibility, or we would be lost in unnavigable wilderness. Of course, practical manifestations of science reward our prevailing views of the plausible. We may contemplate the comparable porosity of planes and passengers, but those of us who have returned intact from high-velocity travel at 37,000 feet respect the real protection conferred by the apparent solidity of our cabin. The effects we experience are more than sufficient cause to build the case for plausibility on perception.

But we are sequestered within the limited terrain of a reality that is itself lost in a far greater reality beyond our perception. We cannot look at the walls of an illusory box and declare there is nothing beyond.

We live out our lives within the bounds of perception that are but a thin layer of what is. Well beneath it, where reality meets bedrock, solar systems, software, and sushi are the same. This goes well beyond lifting the lid from Pandora's box; it blows open the walls of Descartes' carton. It is an admission that you and I, the lid

and the box, poet and page, myth and math, Pandora and Descartes are the same stuff, and there is nothing much to any of us.

I am writing, you are reading, and we are thinking—and therefore we ostensibly are. But that we are is a veritable assault on plausibility. What we think we are is merely what we perceive ourselves to be.

In a vast sea of wonder, where empty space is only interrupted by matter made of still emptier spaces, the most implausible of all things may be that we exist to ponder it. But since we are, we have abundant cause to think, most humbly, about the plausibility of all else.

## REFERENCES

1. Summit on Integrative Medicine and the Health of the Public. Available at: <http://www.iom.edu/Activities/Quality/IntegrativeMed.aspx>. Accessed July 19, 2010.
2. National Center for Complementary and Alternative Medicine. Available at: <http://nccam.nih.gov/health/whatiscam/overview.htm#integ>. Accessed October 11, 2009.
3. The Great Beyond (blog). Integrative Medicine: What's That? Available at: [http://blogs.nature.com/news/thegreatbeyond/2009/02/integrative\\_medicine\\_whats\\_that.html](http://blogs.nature.com/news/thegreatbeyond/2009/02/integrative_medicine_whats_that.html). Accessed October 11, 2009.
4. Katz DL, Williams AL, Girard C, et al. The evidence base for complementary and alternative medicine: methods of Evidence Mapping with application to CAM. *Altern Ther Health Med*. 2003;9:22-30.
5. National Optical Astronomy Observatory. Available at: <http://www.noao.edu/education/peppercorn/pcmain.html>. Accessed July 19, 2010.
6. Eliot TS. *The Hollow Men*. Available at: <http://poetry.poetry.com/poems/784/>. Accessed July 9, 2010.

---

**David L. Katz, MD, MPH**, is the Director of the Prevention Research Center at Yale University School of Medicine in Derby, CT. He is also the Director of the Integrative Medicine Center at Griffin Hospital in Derby, CT. Visit his website at [www.davidkatzmd.com](http://www.davidkatzmd.com)