

NATURAL MAGIC

[by John H. Lienhard](#)

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Today, let's practice Natural Magic. The University of Houston's College of Engineering presents this series about the machines that make our civilization run, and the people whose ingenuity created them.

The ancient science of alchemy enjoyed a flurry of revitalization during the sixteenth century, a bit like [Don Quixote](#) briefly rising from his deathbed to reassert his madness, I suppose. But, in the language of that last gasp, we hear scientists figuring out how to accommodate a new science of experiment and observation.

[John Dee](#), Queen Elizabeth's science advisor, introduced the term *thaumaturgika* for the making of magical machines -- machines for creating an illusion of magic. Consider what thaumaturgical magic it would seem if you could've, say, driven your car into Queen Elizabeth's court. Any machine is magic until it's understood -- just as surely as putting a live person in a box, and sawing the box in two without harming the person, is magic.

Dee took another term from an Italian colleague -- *Magiae Naturalis* or *Natural Magic*. That referred to scientific demonstrations that might as well've been magical. Suppose you made small iron figures of dancers glide and turn about a table-top by the use of hidden magnets. Whether that's magical trickery or a scientific demonstration depends on how much you choose to tell your audience.

We do experiments of that kind for children all the time. And the child does not always come away understanding why they work. A science teacher might place a thick board on a person's head and hammer a nail into it without severely jarring the person. I doubt that many children understand the underlying principles of momentum and inertia. What the child *does* understand is that the person sitting under the board is not frightened. Therefore, this situation must obey some agreed-upon order of nature.

But, as modern objective science took form in the early seventeenth century, the line between magic and science blurred for a season. Historian Robin Rider tells how Francis Bacon finally wrote in the charter of London's Royal Society, that it would provide scientific experiments to extend "the knowledge of Causes." Natural magicians were, he said, too easily tempted to "disguise those things and labour to make them seem more miraculous."

Rider traces demonstration experiments all the way into the nineteenth century. By the late eighteenth century, demonstrations were very popular. Portrait artist [Joseph Wright of Derby](#) also painted people doing experiments. Before the Revolution the French had a [voracious appetite](#) for books about experiments. The Royal Institution of London opened

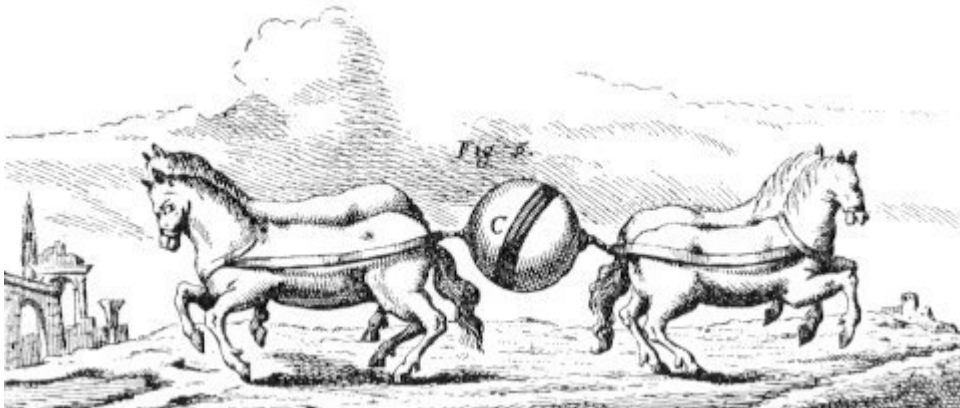
in 1801 with a series of public lecture demonstrations. [Sir Humphrey Davy](#) was a star of that circuit.

With the coming of formal academic science in the nineteenth century, our fascination moved from the stage to textbooks. The word magic no longer seemed to apply to the workings of nature. Yet if you have ever done an experiment that has yielded a new phenomenon, you know the sheer pleasure of that moment. For magic does enter the brief gap that separates discovery from explanation.

I'm John Lienhard, at the University of Houston, where we're interested in the way inventive minds work.

(Theme music)

Rider, R. W., *The Show of Science*. Printed at the Arion Press for the Friends of the Bancroft Library, Univ. of Calif., Berkeley, CA., 1983.



One version of [von Guericke's Magdeburg sphere experiment](#) as shown by Ferrari in *Philosophia Peripatetica*, 1745.



An electrical experiment as shown by Jacquet in *Précis de l'électricité*, 1775.