

THE FAIRYLAND OF SCIENCE

MAGIC IS IN THE MIND OF A FIFTH-GRADER NEAR YOU.

By Saul Griffith

“I HAVE PROMISED TO INTRODUCE YOU TO the fairy-land of science — a somewhat bold promise, seeing that most of you probably look upon science as a bundle of dry facts, while fairyland is all that is beautiful and full of poetry and imagination. But I thoroughly believe myself, and hope to prove to you, that science is full of beautiful pictures, of real poetry, and of wonder-working fairies ... and though they themselves will always remain invisible, yet you will see their wonderful power at work everywhere around you.”

These are the words of Arabella B. Buckley from *The Fairy-Land of Science*, penned in 1891. If I thought about a modern-day equivalent to this little book, I suspect it would be about the wondrous land of invention, and how it promises more reward and delight than the magical land of special effects. I'd like to see kids inspired by the fantastic feats of their big-screen heroes to produce real-world equivalents, to invent their own magic, through a deep understanding of the fairyland of science, with a good application of engineering.

I love magic as much as the next person: I love the illusions, I love the sleight of hand, I love the spectacle. To me, however, the real magic is in trying to explain the phenomenology of the trick. You know you're watching a great magician when you're struggling to explain the physics or even the optics of what's going on.

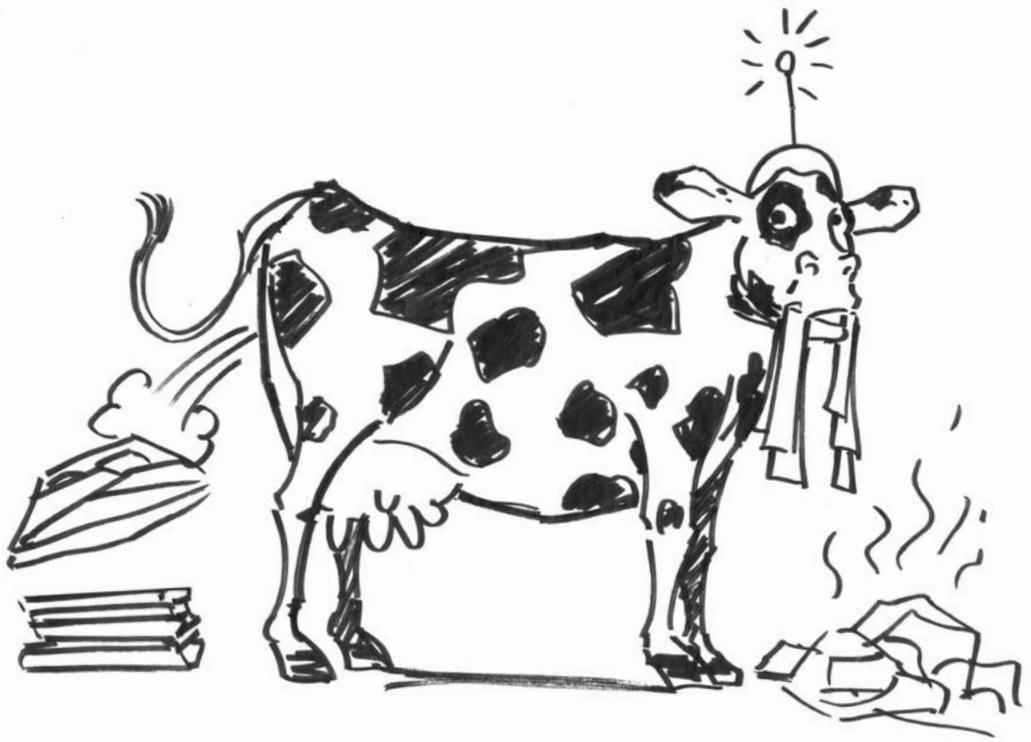
Why not use magic as an entrée into the world of science, engineering, and invention? The phenomenon is the science, the props the invention, the execution the engineering. This way of imagining the world allows kids to envision their own magic, and then to make it.

I recently returned from a tour promoting our first *Howtoons* book (see page 178 for our regularly appearing *MAKE Howtoons*). My co-author Nick Dragotta and I visited seven or eight cities in the United States and talked to groups of 50 to 400 kids at a dozen or so schools. The kids were third-through seventh-graders, and the experience was delightful and inspiring for a host of reasons.

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Nick and I would do a presentation with the kids where we would describe what we do in our professional careers. It turns out kids are amazed to find out that someone can make a living drawing superheroes, and are inspired to find out that one can also grow up to be an inventor and build kites as large as their school auditoriums. (They were, however, horrified when I said I was in school for 26 years. I don't think they thought that was possible, and when faced with more years of school than their current age, it must have seemed like a nightmare.)

After showing kids how to make projects from our book, they became extremely excited when we finished our time with a Q&A. It was actually less a Q&A than an invitation to imagine: if they could invent or draw anything, what would they most like to invent or draw? While I would then discuss how



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one would go about inventing those things, Nick would draw what the kids were describing. It was pretty apparent that in the normal curriculum, kids weren't often encouraged to take inventive flights of fancy outside of story time. They were excited not only to be listened to, but also to have me describe how their ideas were possible and what would have to be done to realize them. They were even more excited as Nick would whip up a drawing of their invention coming to life.

The inventions were often fantastic, occasionally impossible, frequently altruistic, and generally wonderful. Of course some were predictable — flying skateboards and homework-completing machines — but many were lovely flights of fantasy. I was delighted at the proportion of suggested inventions that dealt with clean energy, more efficient cars, and healthier people.

But my favorite came from a 10-year-old girl. To paraphrase: "I'd like to have a robotic cow. It would live in my bedroom, and walk around and eat up my dirty clothes that I left on the floor." And this is where it got interesting. Her tone changed to educational, as she was now teaching me. "As you should know, cows have four stomachs, so my robotic cow can clean my dirty clothes after eating them. The first stomach will be the wash cycle. The

second stomach, of course, will be the rinse cycle. The third stomach will be the dryer, and the fourth stomach will neatly fold my clean clothes."

You can imagine what comes next: in a now very excited tone she said, "And then the robotic cow will walk into my closet and poop out my clean folded clothes." I was inspired by this vision, and by the depth to which it had been thought out. If only iRobot would produce this as the follow-up to the Roomba (the Moomba?). Nick, of course, drew a surreal-looking robotic cow pooping out clean clothes, to roars of laughter from the audience.

I'd like to ask every kid what they'd like to invent. I want to live in the world of magic that these kids dream up — cars that run on water, a vending machine for any combination of soda flavors, an automatically loading marshmallow-making cannon, a single book that feels like paper and contains all the library books in the world, a backpack helicopter, clothes that never need washing, a series of trampolines so you can jump all the way to school, 200-foot leaps at a time.

Magic is in the minds of our fifth-graders. We should talk to them.

Saul Griffith is a co-author of *Howtoons* and was recently named a MacArthur Fellow.