

The Spell That Works

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Here is one definition of magic. Take a metaphor, like "my heart is the sun," and believe that saying it helps make it true. Say the words, and your heart gets warmer. Not as hot as the sun. Just warmer. A spell doesn't have to work all the way. It only has to work a little.

Now watch arithmetic. Picture the numbers as houses on a street, with a gap between each one. That's a metaphor. Numbers aren't houses, and there is no street.

Then arithmetic says 3 is not 4. It can prove it, but only from rules like these: zero comes after no number, and different numbers always have different next numbers. Leave out the first rule, and the street is free to bend into a circle. That's a clock, and on a clock, 15 is 3. Both streets work, one for counting sheep and one for telling time. Which numbers are different depends on which rules were said.

Nobody checked those rules against anything. They were said, and saying them made them true.

That's the definition. A metaphor, said, and made true by the saying. We even have a name for what saying makes true. We call it a fact, from the Latin for a thing made.

You'll answer that arithmetic works. Bridges stand. Planes land.

The rain dance worked too, every time it rained. So the real question is why a spell works. Is it real, or does the world just go along? With the rain dance, we found out: dance on some days and not others, and count the rain.

Try that with difference. To run the test, you have to tell the rainy days from the dry ones, the times it worked from the times it didn't. Every test is made of telling things apart. There are no days without difference to compare against.

So we don't know whether arithmetic works because difference is real, or whether difference seems real because arithmetic works. A Nobel-winning physicist looked at how well mathematics fits the world and called it a miracle, "a wonderful gift which we neither understand nor deserve." He wasn't being poetic. He meant nobody knows.

Arithmetic works. The rain dance worked on rainy days. The difference is that we could check the rain dance.

Why is a raven like a writing desk? Lewis Carroll asked that riddle in *Alice*, and later admitted he'd invented it with no answer at all. In the same breath, he offered one anyway. Even the man who built the riddle couldn't stop himself from finding a likeness. Still, it sounds impossible. What could a raven and a desk have in common?

Turn it around: how is a raven different from a writing desk? That sounds too easy to ask.

Now suppose a raven dies at the foot of a tree. It rots. Some of it goes into the soil and some into the air, and the tree takes in both. Years later the tree is cut and made into a desk. Some of what was the raven is now the desk.

Which question is easy now?

Listen to how we talk about difference. Things are far apart, or close. Worlds apart. Poles apart. There's a fine line between them. The word itself comes from the Latin for "carry apart." Every way we have of saying "different" is a picture of two things with space between them, like the houses on that street. And we don't hear it as a picture. We think the space is really there, and that some things are farther apart than others.

"Metaphor" is a carrying word too. It comes from the Greek for "carry across," and its carrying grows from the same ancient root as the carrying in "differ." A metaphor carries across. A difference carries apart. It's one picture, pointed two ways.

The raven breaks the picture. It wasn't carried apart from the desk. It was carried into it.

And there isn't one difference. Two sheep are two. Red isn't blue. Today is warmer than yesterday. A raven isn't a desk. Those are different kinds of difference, and the picture of distance puts them all on one street, where everything is some number of houses from everything else.

How many kinds of difference are there? To tell the kinds apart, you need more differences, and those need differences of their own. Every distinction asks for another. It never ends.

Philosophers know a staircase like this from the other side. Take a heap of sand and remove one grain at a time. When does it stop being a heap? No single grain does it. There's only a blurry border, then a blurry border around the blurry border, and so on down. They call that vagueness, and they treat it as a problem with our words.

Vagueness is the line we can never find. Difference is the line we can never stop finding. One gets called a problem, and the other gets called precision.

Because there's always a finer difference to point out, anyone who wants to stop you from adding things up can always find one. Precision can help you see more. It can also keep you from counting.

Mathematicians believe careful definitions take the pictures out. Continuity, the idea of a line with no breaks, is defined with two Greek letters, epsilon and delta, so nobody has to picture anything. But delta is the letter math uses for difference: in school, Δx is "the change in x," the difference between two x's. And the definition is all about how far apart two numbers are. The picture of distance didn't leave. It moved down a floor.

Notice what our grammar does with likeness and difference. Say "my heart is the sun," and everyone hears a metaphor, because "is" asks two things to share everything, and one difference breaks it. Say "my heart is not the sun," and it's simply true, because "is not" needs only one difference. Now say "the raven and the desk are worlds apart." Nobody objects. The only part anyone checks is "not the same," which is always true, and the worlds and the distance ride along on it, passing as fact. A metaphor of likeness gets called a metaphor. A metaphor of difference gets called the truth.

Everything is different from everything else. And everything is like everything else, in some way. Both are always true. So when someone tells you two things are different, that isn't news about the things. It's news about which of two true things they chose to say.

We even have a phrase for the choosing. "Apples and oranges" means they can't be counted together. But two apples and three oranges make five pieces of fruit. Nothing in the fruit stopped us. The phrase did.

If you took algebra, you were graded on that phrase. $2x + 3y$ can't be simplified, because they aren't "like terms." Even the rule is named for likeness: only like things get added. Some teachers taught it with fruit: a for apples, o for oranges, and you can't add them. The rule was about symbols. Repeated week after week, it began to feel like a fact about the world. That's how a spell works: a picture of distance, said with confidence, then made true by everyone who stops counting.

Counting itself works the same way. It works on sheep. It fails on raindrops: one drop and one drop run together into one drop.

We gave the smallest piece of the world a Greek name, atom, which means "uncuttable." It was the final one, the thing that could only ever be counted as one. Then we cut it, and we have been living with what came out ever since.

Arithmetic works wherever the world keeps apart what we've said is apart. Like the heart and the sun, the spell only has to work a little to pass for a fact. Does it work because things really are separate, or because we only count the things that stay separate and call that proof? From inside the counting, there's no way to tell.

Carroll's riddle was supposed to have no answer. It has one. You might be writing on it.