

WELL, WHAT *DO* YOU DO THEN?

CHRISTOPHER TUFFLEY

I'm at the front of the check-out queue at Wild Oats, the second of the two supermarkets a block from my house. I don't usually come to this one, it's smaller and has something of a hip-yuppy-expensive feel to it, but a couple of my housemates do some of their shopping here and I thought I'd try it for a change. There are two men running the checkstand, both I'd guess a little younger than I am. One scans my groceries and the other packs them in the canvas bag I brought with me.

"Are you a math major?"

What? Oh, I'm wearing one of my Mathcamp shirts. "No," I say, uncertainly. After more than four years in the States I'm still a little unsure, but I think 'math major' applies only to undergrads. "No," I tell the bagger, "I'm a mathematics graduate student."

"At Cal?"

"Yeah, at UC Berkeley."

"What's 15% of thirty-four eighty-six?"—the scanner this time.

"I dunno."

"C'mon, quick, what's 15% of thirty-four eighty-six? You're a math major, right?"

"Ah man, that's arithmetic, that's not mathematics. Everyone knows mathematicians are lousy at arithmetic."

"Well, what *do* you do then?"

"Topology."

"You mean, like maps?"

Well, yes, but I don't think we mean the same thing by 'map.' "No, you're thinking of *topography*. I do topology."

"What's that?"

"Well...it's kind of about shape, and space. The usual joke is that a topologist is someone who can't tell the difference between a coffee cup and a donut—to a topologist they're really the same." I gesture with my hands, gestures I've made before, gestures I'll make again. "See, the hole in the donut is the handle of the coffee cup, and if you had a donut made out of clay you could mould it like this"—more gestures, pinching clay, forming a bowl—"into a cup without tearing it."

They look at me blankly. I try again. "Have you got paper, tape, and scissors?"

The bagger bustles off eagerly to get some, and while he's gone I swipe my card and sign my receipt. \$34.86, it turns out, is the amount I just spent. The bagger comes back with some glossy ads, and I cut off a long narrow strip and bring its ends together.

"I'm going to tape the ends together, but before I do that, I'm going to put a half twist in it, like this, see? What you get's called a Möbius strip. Now, how many sides do you think it has?"

They sense a trick question. "Well, depends what you call a side, doesn't it?" We banter good-naturedly, agree that a side is a side, and they tell me two. "Let's see then." Gesturing at my bare arms I say "Look, nothing up this sleeve, nothing up that sleeve," take the pen, and pin the Möbius strip to the counter with it. Holding the pen down I pull the strip through beneath it, and once I'm back where I started there is ink on both sides of the paper.

They are impressed. I continue. "How many edges do you think it has?"

"One." "Two." I hand it to the scanner to run his finger round and check. "Just one," he says. I pick up the scissors.

"I'm going to cut it down the middle now, like this"—*snip*. "How many pieces of paper do you think we'll get?"

They're catching on that the answer is always one, they're thinking about why. I cut, and the paper falls into one long loop. "How many sides does this one have?"

"Two!"

"Good! Now, I'm going to make another, a bit wider this time"—cut, twist, tape—"and I'm going to cut this one in thirds, like this." I cut two short slits next to each other, a third of the width apart. "How many pieces of paper do you think we'll get this time?"

"Two..." says the scanner. "One long one, like this," gesturing at the one we just cut, "and another short one, like the thing we started with."

"That's right! But something else interesting happens too. Let's see." I start to cut, beginning at one of the slits. Once around the loop the scissors come to the second slit, continue, twice around the loop and they close in on the first. The cutting has taken a little while, and my audience's attention has wandered. I raise the scissors dramatically. "I'm closing up!"

They're back with me. *Snip!*

The paper falls in two, falling more cleanly than I'd even thought to hope or strive for: the short inner band, the Möbius strip, is looped around the upraised blades, and the long outer loop, linked through it, dangles. "That," I say, "is topology. *That's* the kind of mathematics I do."