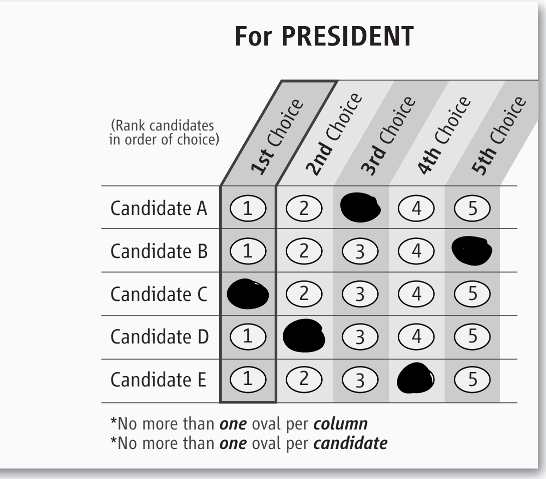


Who's on first? Optical illusion (*left*) mimics a paradoxical "everybody wins" outcome that can actually occur in ranked-choice voting.

"But it may be more than coincidence that one candidate almost always handily beats four opponents." Saari is similarly unsure. "The only way such an empirical result can happen is if people have remarkably similar preferences, much more so than we would expect in general society," he says.

Regenwetter agrees there's a lot left to be explained. But it's becoming clear, he says, that "the empirical world is highly different from the picture that has generally emerged out of the mathematical theory of social choice."

---

of these "perfect parallelograms" to serve as sides of candidate parallelepipeds and devised a computer algorithm to pick out the perfect ones.

"The biggest surprise for me was how quickly we got results," Sawyer says. Their first example has edges of length 271, 106, and 103 (see figure, left). In all, the computer search found 30 perfect parallelepipeds, with edge lengths up to 3920. Some are tantalizingly close to being cuboids, with one or two rectangular sides. Such findings "may spark even more interest in the perfect cuboid problem," Sawyer says.

Ezra Brown, a number theorist at Virginia Polytechnic Institute and State University in Blacksburg, agrees. "The size of Reiter and Sawyer's smallest solution is very surprising," he says. "Apparently, easing the restrictions that the faces be rectangles is more crucial than anyone thought." Nonetheless, he notes, perfect cuboids, if they exist at all, are a long way off: Computers have looked at all possible bricks with edge lengths up to 10 billion without finding a single one that's perfect.

CREDIT (PHOTO): SUSANNA CUYLER

What Comes Next?

One of mathematicians' most beloved Web sites is getting ready for a makeover. The Online Encyclopedia of Integer Sequences, established by Neil Sloane at AT&T Labs Research in 1996 and run largely as a one-man shop, is poised to go "wiki," with 50 associate editors taking over much of the workload.

The OEIS, or simply "Sloane" as it's known to sequence fanatics, is a database of nearly 200,000 lists of numbers—a mathematical equivalent to the FBI's voluminous fingerprint files. Much as fingerprints give police a quick way to link a new crime to earlier ones, sequences enable researchers to make connections between mathematical problems that might otherwise go unnoticed. The innocuous-seeming sequence 1, 2, 5, 14, 42, 132, …, for example, arises in a huge number of different contexts, from counting the arrangements of nonintersecting chords inside a circle to enumerating secondary structure possibilities of RNA. To sequence fanatics, such "Catalan numbers," as they're known, are even more famous than the ubiquitous Fibonacci sequence 1, 1, 2, 3, 5, 8, 13, … .

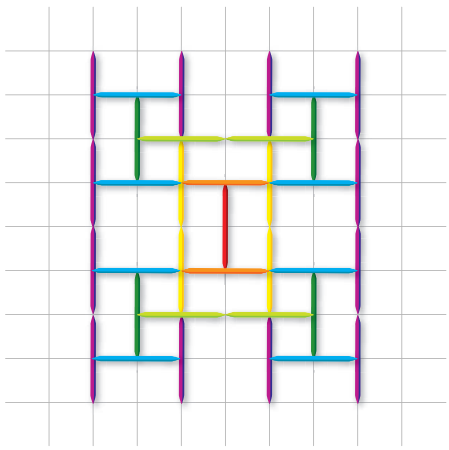
Sloane began compiling sequences in 1965 as a graduate student at Cornell University. By 1973 he had 2372 of them, which he published as *A Handbook of Integer Sequences*. An updated edition, with 5487 sequences, appeared in 1995, with the help of Simon Plouffe of the University of Quebec, Montreal. But by then, Sloane was already moving online. The OEIS made its debut a year later, with a database of 10,000 sequences.

The OEIS "is one of the most useful tools available online for the working mathematician," says Doron Zeilberger, a combinatorialist at Rutgers University, New Brunswick. "It also is a great tool for determining the novelty of a new sequence. If it is not in Sloane, it is most likely to be new!"

The Web site invites users to submit new sequences or comment on existing ones. Such contributions have fueled the database's steady growth. In 2009 alone, the total increased by 18,709 sequences, or more than 50 a day. "Sequences are still pouring in," Sloane says.

Even as he edits the constant stream of new sequences, Sloane takes time to admire some of the contributions. His latest favorite is the "toothpick sequence," added in 2008 by Omar Pol, an OEIS contributor from Buenos Aires. The toothpick sequence registers the increasing size of a geometric arrangement of toothpicks, in which a new batch is added at each stage, centered on and at right angles to the exposed tips of the previous batch (see figure). The picture that emerges displays surprising fractal growth. "It's got beautiful structure," Sloane says. He and his AT&T colleague David Applegate have written a paper on the sequence's mathematical properties, and Applegate has contributed a movie of its geometric growth, linked to its entry in the OEIS.

Sloane set up the OEIS Foundation last year and transferred intellectual-property rights to the nonprofit organization. With Applegate's help, he plans to move the database to a wiki format, giving each sequence its own Web page, with new submissions moderated by a board of editors. The transition has hit a snag, however: Search-engine software in the "wikiverse" can't yet handle sequences of numbers.



Chewy. Database managed by Neil Sloan (*top*) includes the "toothpick" sequence (1, 3, 7, 11, 15, 23, 35,...), shown here in color-coded steps.

Once that technicality is overcome, Sloane expects the wiki format to be an improvement. "It's the correct mechanism for handling the database," he says. As for his anticipated reduced workload, "it'll mostly be a relief. On the other hand, I'll miss all the e-mails."

–BARRY CIPRA