PROGRAMS THAT KNOW WHAT YOU'RE THINKING
Researchers can predict which noun a person is visualizing.
www.nature.com/news

S. CHIRKOV/REUTERS

Mikhail Kovalchuk (right) has close ties with Russian prime minister Vladimir Putin (left).

Institute for Information Transmission Problems in Moscow. "It seemed obvious that he would merely act as a kind of interim president for a year or so, keeping the position for Kovalchuk."

Scientists close to the academy speculate that many members voted against Kovalchuk because they felt under too much pressure from its leadership to agree with its favourites. Others think that academics were disappointed that the money flow from Rosnanotech, a tax-exempt body set up last year to coordinate Russia's nanotechnology initiative to academy institutes, was sparser than they had hoped. Kovalchuk has a great deal of influence over Rosnanotech and is a member of its board.

Indeed, the desire for Rosnanotech money has taken strange forms. In May, an over-eager Siberian scientist sent a self-invented 'nanopowder' to at least five high-ranking academy members, including Kovalchuk, whose deputy director Svetlana Zheludeva opened the package. When Zheludeva died soon after, murder was suggested by the Russian media. Russian health officials have dismissed such speculation, saying that her death on 17 May from acute liver failure was not due to poison. ■

Quirin Schiermeier

Mars reveals early mysteries

When NASA's Phoenix spacecraft settled in Mars' northern latitudes on 25 May, there was little doubt that it would land amid a quilted pattern of troughs created over time by ice contracting and cracking below the surface. The surprise is that Phoenix is surrounded by 'polygons' much smaller than expected.

"I'm not in a panic," says mission scientist Mike Mellon of the University of Colorado at Boulder. "But I'm intrigued that there's something we can learn here about Mars that we didn't know before."

Other surprises may arise this week. As *Nature* went to press, Phoenix had scooped its first handful of martian soil and was expected to unleash a battery of geochemical instruments on soil and ice samples. But the polygons — with their direct analogies in permafrost regions on Earth — offer one of the mission's earliest mysteries.

Polygons form as winter temperatures cause the ice to contract. Eventually, the tension caused by the contraction exceeds the strength of the ice, and millimetre-scale cracks open up. Soil plugs the cracks and, when temperatures rise again, the ice buckles under the pressure, pushing up the centre of the polygons and over time creating troughs at the boundaries (see picture).

Using images from the Mars Reconnaissance Orbiter (MRO) satellite, Mellon had previously measured 915 polygons in Phoenix's landing area with an average diameter of 4.6 metres. The smallest were 2.5 metres across, although the limits of the MRO camera prevented Mellon from identifying many that were

smaller than that. When he modelled the ice-cracking process that forms the polygons, he calculated that 5 metres would be their typical diameter, he and colleagues report in a paper accepted for publication in the *Journal of Geophysical Research*. Also evident was the fainter imprint of a larger polygon system, which had troughs 22 metres apart and which could represent an earlier climatic epoch when Mars' spin axis tilted more, resulting in deeper ice near the poles.

The modelling work made perfect sense until the first images from Phoenix last week allowed scientists to measure two polygons just 1.4 metres and 2.4 metres across — significantly smaller than the 5-metre and 22-metre ones. "We have to refine our theory in such a way that it explains all three scales," Mellon says. He hopes studies of the soil and ice parameters — their depth, strength and composition — will help him to adjust his models.

On Earth, there are two main types of cracks that lead to polygons. In the wet of the Arctic, melt water from the icy edges of the cracks flows in and refreezes, building up an ice wedge over time. But in the dry deserts of Antarctica, dust falls into the cracks in the subsurface ice and builds up sand wedges.

Phoenix should be able to discern between the two crack styles by digging a trough, says Ray Arvidson, a planetary scientist at Washington University in St. Louis, Missouri, and lead scientist for Phoenix's robotic arm. Although many scientists expect to find a sand wedge, an ice wedge would be a startling discovery — evidence that water flowed near the surface in the recent past.

Arvidson served on the science team for the Viking landers in the 1970s, and one of his disappointments is that a polygon lay just out of reach of Viking 2, which, until the arrival of Phoenix, had explored the most northern latitude of Mars. This time, one polygon, dubbed Humpty Dumpty, sits directly within Phoenix's digging area.

The arm, working like a backhoe, is expected to scrape a trench from the elevated centre of a polygonal mound into a trough called the Wall. ■

Eric Hand

See Snapshot Feature, page 712.

Check our blog for updates from the Phoenix mission: <http://tinyurl.com/3hhax9>.

NASA/JPL-CALTECH/UNIV. ARIZONA

Troughs on Mars are presenting a puzzle.