Bad samples and political polls

"For so it is, O Lord, my God, I measure it and I do not know what it is that I am measuring."

CONFESSIONS OF ST. AUGUSTINE

As the polling crescendo mounts through election year, candidates and parties move up and down in popularity as expressed in the polls. Since margins between candidates are often small, such shifts in public opinion seem reasonable.

But days before the Republican convention two leading commercial opinion samplers—the Gallup organization and Louis Harris—produced within a week of each other such conflicting results on sentiment for Richard Nixon and Nelson Rockefeller that it hardly seemed likely the public could be that mercurial. It would have meant a monumental one-week shift toward Rockefeller—Nixon losing four percentage points, Rockefeller gaining an equal amount.

Gallup and Harris claimed that such a shift had occurred, but a third commercial pollster, Burns W. Roper, said it was "hard to believe." While newspapers bandy the figures and as interested public looks on, authorities on statistics and sampling declare that such an extreme shift was, in fact, unlikely; current political polling practices are simply not accurate enough to judge differences reliably over a range as narrow as four points.

There is a larger range of error than any of the three commercial pollsters will imply, says Dr. Angus Campbell, director of the Survey Research Center at the University of Michigan. The Rockefeller-Nixon difference was easily within that range, he says. Chicago's Dr. Paul Sheatsley, at the National Opinion Research Center, agrees.

In fact, the results are uncertain to the point that the range of error itself cannot be pinpointed.

Dr. Campbell points out two major reasons why political polls fail to attain the level of accuracy that is possible in opinion sampling. The samples are small, and not truly random.

Under the best of circumstances, modern pollsters can reduce error to less than one percent. But such accuracy depends on a sample of at least 5,000 cases. Political polls usually have a sample of about 1,200 to 1,500 people (out of a population of 200 million).

Accurate polling is a very expensive business. Although pollsters are not anxious to make the figures public, it is known that a large industrial client might pay from $50,000 to $100,000 for a first class piece of research. The political polls, taken for newspaper syndication, might run to $10,000.

Also, modern polling methods, based on probability sampling, require that the people interviewed be selected on a random basis. "You must see to it that every individual in the country has an equal chance of being chosen," says Dr. Campbell.

For their political polls, commercial organizations use random selection up to the last step. But there the process is modified.

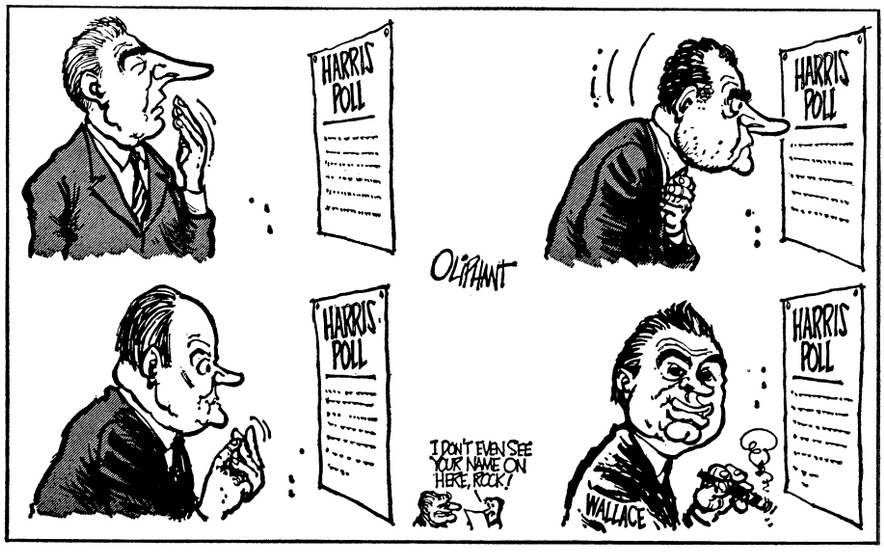
The typical procedure is to break the country down into sections, such as counties, then take perhaps 100 of them by random choice. These are then broken down into areas and finally blocks. Interviewers move into the final random selection of blocks to sample the opinions of men and women alternately. But because of pressures of time or money or both, interviewers who miss people away from home do not return to pick them up, and randomness breaks down.

The Gallup organization, which does 99 percent of its polling on weekends, gives extra weight to the opinions of persons who were away from home on the previous Saturday, and even more to those who were away for two consecutive Saturdays. The theory is that this makes up for similar people who are not home when the pollsters call, and thus go uninterviewed.

But Dr. Campbell doubts whether such corrections can really be computed well enough to reduce error greatly.

There is a chance, of course, that public opinion on Nixon and Rockefeller did swing as much as the Gallup and Harris polls indicated. But, says Dr. Campbell, "our experience in measuring attitude changes makes me very suspicious."

In any case, the size of the sample used leaves that question unanswered. Political polls, says Columbia University's Dr. Herbert Hyman, are not good enough to forecast the outcome of a race when the candidates are close and when the statistics fall into a critical zone where three or four points means winning or losing an election. "One would simply not regard them as useful for this function."



Oliphant © 1968—The Denver Post

VENUS DATA

Even hotter and denser

Once they got an almost ideally matched pair of space probes (one Russian and one American) complementing each other in the vicinity of Venus last October, scientists thought they had at last licked the cloud-shrouded planet's two most tantalizing mysteries—the temperature and atmospheric pressure at the surface. But there was a hitch.

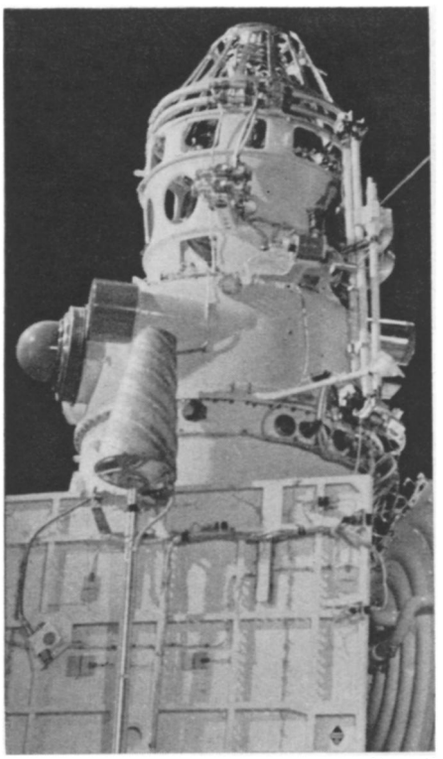
The measurements assumed that Russia's Venus 4 probe had, as it was claimed, zipped in to about 24 kilometers above the planet, then released a parachute-equipped instrument package which gathered and transmitted data all the way down to its collision with the surface.

There is now reason to believe that the package was still 24 kilometers above the surface when its transmissions stopped. If true, this could mean that the atmosphere at the planet's surface is some five times as dense and almost

300 degrees warmer than the Soviet data indicated.

This possibility has come to light as a result of new radar measurements of the planet made from earth, combined with analysis of the trajectory of the U.S. Mariner 5 spacecraft as it curved around behind Venus two days after the Russian probe's arrival.

The analysis of Mariner's path, affected by Venus' gravitational attraction, revealed the distance to the planet's center of mass, and the last data from the Russian probe, fitted onto the imaginary line between the mass center and Mariner, presumably indicated the



Novosti

Venus 4: but for an altimeter. . . .

surface of the planet. Judging by the distance from the last Russian data to the mass center, the radius of Venus seemed to be 6,078 kilometers.

But previous studies, by both U.S. and Soviet researchers, had indicated that the planet's radius was only 6,056 km.—somebody was wrong. Because the earlier, smaller figure resulted from seven years of painstaking radar measurement from earth without any spacecraft for correlation, and because the complex equations offered such possibility for error, some scientists tended to favor the new number. But the question was open.

Now it seems to have been closed, for the time, in favor of the old.

While Mariner 5 was in the vicinity of Venus, Dr. Von R. Eshleman of Stanford University in Palo Alto, Calif., together with colleagues from Stanford, the University of California's Jet Propulsion Laboratory and the 1,000-foot radio telescope at Arecibo, Puerto Rico, used the giant telescope to bounce radar waves from the surface of Venus. By comparing Arecibo's distance with Mariner's distance from the planet's center of mass, the scientists were able to confirm precisely (and confidently), the earlier, smaller radar estimates of Venus' radius.

According to that calculation, the pressure and temperature data from both spacecraft were wrong, since the figures were assumed to be for altitudes some 24 km. higher than now appears to be the case. The data from the two spacecraft did overlap, however ("It fit very well indeed," Dr. Eshleman says), so determining the new surface estimates was only a matter of extrapolation.

The "new Venus," therefore, has an estimated surface temperature of 800 degrees F. and an atmospheric pressure 100 times greater than that of earth. The original Russian spacecraft data indicated a cooler, but still uncomfortable, 536 degrees, and a somewhat less crushing 22 atmospheres of pressure.

But why the error? What made the Soviet probe misjudge its height by 24 km.?

When the instrument package was released, its altimeter indicated that it was about 24 km. above the surface. However, says Dr. Eshleman, some kinds of altimeters give the same signal at multiples of a given height. If the spacecraft was really 48 km. up when it dropped its instrument package, the mystery is solved. All the data fit consistently together if that one, simple correction is made.

There is other evidence as well that the instruments failed while still descending through Venus' atmosphere. Their batteries were reportedly designed to operate for 100 minutes (the signals actually stopped after 94). This, Dr. Eshleman says, would have been just about enough time for the package to float from a level of 0.7 atmospheres—the first reading from the instruments—down to where the pressure would be about 20. It would have taken several times the maximum battery lifetime to fall to the newly estimated surface pressure level. Thus, according to the scientist, they must have died in mid-air.

MIRV

Overkilling negotiations

Lockheed

Dwarfing its Polaris A3 predecessor, a multi-warhead Poseidon missile.

When the Soviet Union began in late 1966 to deploy antimissile defenses around Moscow, the immediate response of the United States was to develop multiple warheads for its key missile deterrents: the Poseidon being developed for launching from submarines, and the Minuteman III, latest generation of the silo-based ICBM.

The logic, according to then-Secretary of Defense Robert S. McNamara was that the Soviet ABM threatened the ability of the U.S. to deter attack through the effective threat of instant retaliation.

To build an American version of the ABM, McNamara argued, would simply accelerate the arms race. He opted for MIRV—the multiple, independently targeted reentry vehicle—designed to flood an enemy defensive system with more warheads than it could handle, thereby reestablishing the deterrent and the stalemate.

It was with McNamara's reluctant accord that Congress trumped the Secretary's ace by opting for an American ABM—upsetting the balance once more.

In this perspective, the Defense Department late last week moved into the