

POLITICS GOOD, COMPUTATION BAD

by R. Theory Group

POLITICS IS OFTEN REGARDED AS A DIRTY, IGNORANT PROFESSION. MANY GREAT MINDS HAVE PONDERED WHY THIS IS SO.



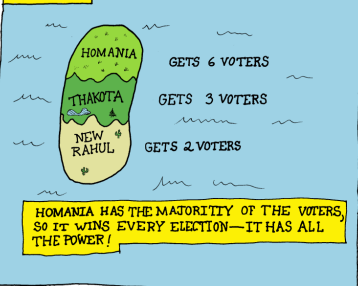
NOWADAYS, WE CAN ACTUALLY PROVE THAT CERTAIN POLITICALLY SOUND IDEAS ARE SIMPLY IMPRACTICAL, COMPUTATIONALLY SPEAKING.



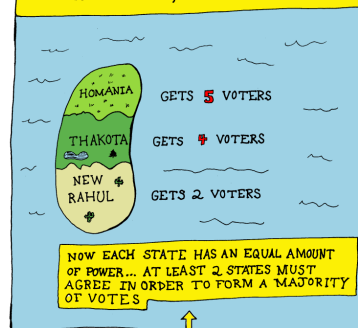
OUR FOREFATHERS TOUGH OVER HOW TO ALLOCATE ELECTORAL VOTES IN PROPORTION TO THE POPULATION OF EACH STATE.



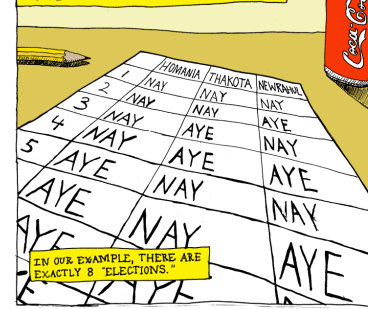
IN SPITE OF ALL THE BICKERING, EACH PROPOSAL HAD THE FOLLOWING FLAW. CONSIDER A COUNTRY WITH 3 STATES AND 11 ELECTORAL VOTERS



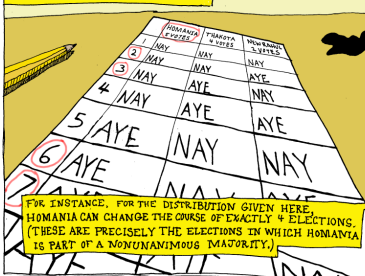
IF WE TAKE 1 VOTE FROM HOMANIA AND GIVE IT TO THAKOTA, EVERYTHING CHANGES...



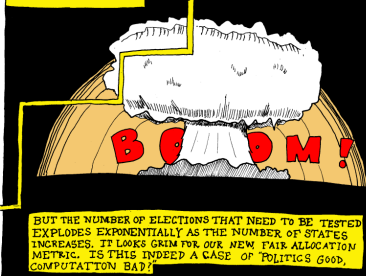
THUS, THE NUMBER OF VOTES A STATE GETS IS A POOR INDICATOR OF HOW MUCH POWER THE STATE HAS. BUT HOW CAN WE QUANTIFY VOTING POWER? CONSIDER ALL THE WAYS THE STATES CAN VOTE. WE CALL EACH "WAY" AN "ELECTION"



NOW, FOR A GIVEN DISTRIBUTION OF VOTERS, CHOOSE A STATE AND COUNT THE NUMBER OF "ELECTIONS" IN WHICH CHANGING THE WAY THAT STATE VOTES (NOT KEEPING THE VOTES OF THE OTHER STATES THE SAME) ACTUALLY CHANGES THE OUTCOME OF THE ELECTION. THIS NUMBER IS CALLED THE "POWER INDEX".



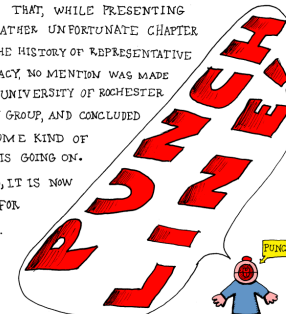
SO, WE WOULD LIKE TO ALLOCATE ELECTORAL VOTERS IN A WAY THAT IS RELATED TO EACH STATE'S POWER INDEX. HOWEVER, COMPUTING THE POWER INDEX IS KNOWN* TO BE $\#P$ COMPLETE. CONSEQUENTLY, THE ONLY KNOWN WAY TO CALCULATE THE POWER INDEX IS TO TEST EVERY SINGLE ELECTION.



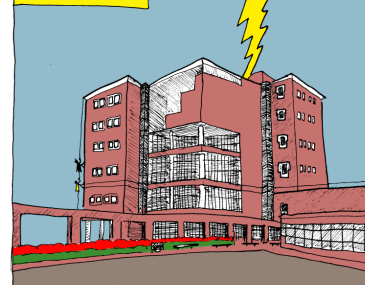
* K. PRASAD AND J. KELLY, NP-COMPLETENESS OF SOME PROBLEMS CONCERNING VOTING GAMES. INTERNATIONAL JOURNAL OF GAME THEORY, 19:1-7, 1990.

THE POLITICALLY ASTUTE READER MAY HAVE NOTICED THAT, WHILE PRESENTING THIS RATHER UNFORTUNATE CHAPTER FROM THE HISTORY OF REPRESENTATIVE DEMOCRACY, NO MENTION WAS MADE OF THE UNIVERSITY OF ROCHESTER THEORY GROUP, AND CONCLUDED THAT SOME KIND OF SETUP IS GOING ON.

INDEED, IT IS NOW TIME FOR THE...



IN 1997, A GROUP OF UNIVERSITY OF ROCHESTER STUDENTS, UNDER THE GUIDANCE OF PROFESSOR LAKSHMANA RAMANANDRA, DISCOVERED THAT A HEURISTIC FOR ALLOCATING ELECTORAL VOTES, LIKE ALL HEURISTICS, THERE IS NOT GUARANTEED TO PROVIDE AN OPTIMAL SOLUTION.



NEVERTHELESS, IN A SERIES OF 11 EXPERIMENTS (ONE FOR EACH US CONGRESS BETWEEN 1900 AND 1990), THEIR HEURISTIC APPROACH PROVIDED AFAIRER (WITH RESPECT TO THE POWER INDEX) APPORTIONMENT OF THE ELECTORAL COLLEGE THAN A MULTITUDE OF HISTORICAL APPORTIONMENT METHODS, INCLUDING THE ONE PRESENTLY USED. NO DOUBT OUR FOREFATHERS WOULD BE IMPRESSED.



WELL, AS THEY SAY IN THE PICTURES, THAT'S ALL FOLKS! WHAT'S THAT? YOU SAY YOU WANT MORE COMPUTATIONAL POLITICS? THEN CHECK OUT THESE FABULOUS PAPERS BY THE ROCHESTER THEORY GROUP AND FRIENDS!!!

- [1] L. RAMANANDRA, THE COMPLEXITY OF KENNEDY ELECTIONS. IN PREPARATION.
- [2] L. RAMANANDRA, L. RAMANANDRA, COMPUTATIONAL POLITICS: ELECTORAL SYSTEMS. IN PROCEEDINGS OF THE 14TH INTERNATIONAL SYMPOSIUM ON MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE, PAGES 498-511, SPRINGER, 2000.
- [3] L. RAMANANDRA, L. RAMANANDRA, J. RAMAN, EXACT ANALYSIS OF KENNEDY ELECTIONS (WITH CARROLL'S WINNING STATE W). IS COMPLETE FOR PARALLEL ACCESS TO NP. JOURNAL OF THE ACM, 44(6): 856-873, 1997.
- [4] L. RAMANANDRA, K. RAMANATHAN, P. SETHUPATHY, AND R. RAMAN, POWER BALANCE AND APPORTIONMENT ALGORITHMS FOR THE UNITED STATES CONGRESS. ACM JOURNAL OF EXPERIMENTAL ALGORITHMS, 10, 1997.

URL: <http://www.gsa.com.org/1997/ramanandra.html>