

BI-CO MATHEMATICS COLLOQUIUM

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"The Mathematics of Three-Candidate Elections"

Monday February 21, 2011

Talk at 4:00 p.m. – Park 328

Tea at 3:45 p.m. – Park 355, Math Lounge

Abstract: Some observers say that the race between Bush and Gore in 2000 was influenced by the votes Ralph Nader won in Florida, or that Bill Clinton's 1992 election was influenced by the candidacy of Ross Perot. Did Chileans overlook a consensus centrist candidate when they elected Salvador Allende in 1970? What can we learn from John Anderson, Joe Lieberman, Lisa Murkowski, Charlie Crist, John Edwards, Jean-Marie Le Pen, and Vincente Fox? Each of them was involved in a famous three-candidate election. The outcomes of these elections did not necessarily all please everyone.

Would we do better if we asked voters to rank all of the candidates? We would then have to decide how to count the votes. Several systems have been proposed, including instant runoffs, Borda counts, approval voting, and Eric Maskin's "true majority" rule (which picks "Condorcet winners" and which has trouble with "Condorcet cycles"). All of them have their advocates, and some are in use in various countries or organizations.

We might want a system that respects the "No Spoilers" rule---formally, the property of "Independence of Irrelevant Alternatives" or "IIA." This says that if X would beat Y in a head-to-head race, then Y should not be the winner of an X-Y-Z race. It seems a simple enough requirement, but the Arrow Impossibility Theorem tells us, essentially, that no such system is possible. This is a distressing result. After sixty years, political theorists are still going through the stages of grief.

We will review this theorem and its significance and give some real and hypothetical examples. Along the way we will discuss expressive voting (voting for Nader when one prefers Gore), strategic voting (voting for Gore when one prefers Nader), and the kinds of institutions that arise from various rules for vote counting. We might also mention American Idol, or Henry VIII's suppression of the monasteries.

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