Badminton and the Science of Rule Making

By Jason Hartline and Robert Kleinberg

Huffington Post, August 13, 2012

On July 31 badminton fans were dealt an Olympic injustice, watching in disbelief as athletes deliberately served into the net and hit wayward shots in an attempt to lose a match. The gravest injustice, however, took place well before the games began, when tournament organizers changed the event's format, resulting in a Catch-22 that pitted the goal of winning the tournament against the principles of sportsmanship. On Aug. 1, four teams were disqualified for "not using one's best efforts to win a match" and "conducting oneself in a manner that is clearly abusive or detrimental to the sport." The irony is that the athletes, in fact, were making their best effort to win an Olympic medal, while it was the tournament rules that ultimately encouraged play that is detrimental to the sport.

There is a science that studies the design of rules for strategic play, and it is called mechanism design. In the general framework of mechanism design, a planner asks how the rules of a system should be devised so that when participants behave strategically, a desirable outcome is achieved. It has been applied with great success to a wide range of problems, such as matching medical school graduates to hospitals, allocating takeoff and landing slots at airports, selling advertisements on the Internet, and voting in elections.

Applied to sporting events, mechanism design dictates that losing a match should never improve a team's chances of winning a tournament. That principle was violated in Olympic badminton when an upset loss by the world's second-ranked team gave the remaining teams an incentive to lose their final round-robin match and thus avoid an unfavorable pairing against strong opponents in the playoff stage of the competition. Ironically, this problem can never arise in a single-elimination tournament, the format in use from badminton's Olympic debut up until this year.

Outside the sports arena, mechanism design has a widespread influence on public policy. For example, in the last few years Boston and Chicago followed the advice of economists in adopting improved mechanisms for matching children to public schools. Under the previous systems, which attempted to give as many students as possible their first choice, families that listed their favorite schools honestly were at a disadvantage to those that deliberately listed a school that was good but not over-demanded as their first or second choice.

Similar considerations are at play, of course, any time a voter casts a ballot for a candidate who is deemed electable rather than "wasting" a vote on his or her top choice. Opportunities for tactical voting are reduced by instant-runoff voting, a system where voters cast ballots ranking the candidates in order of preference. A proposal to adopt this system for parliamentary elections in the UK (where it is known as the Alternative Vote) was regrettably defeated in a highly publicized

2011 referendum. Similar initiatives were also rejected in several U.S. states but have been adopted in cities including San Francisco and Minneapolis.

People and firms become much better at cheating when large sums of money are at stake, so it is vital for governments to get the details right in complex resource allocation protocols, as when the FCC sells spectrum licenses to wireless companies. In one memorable manipulation of that system, firms circumvented the rules against collusion by using the trailing digits of their bids to send coded signals to their competitors. The FCC has since been in close contact with auction theorists in implementing more transparent mechanisms.

These successes and failures point to a few simple lessons. Even seemingly common-sense protocols can be susceptible to subtle manipulations, and it is counterproductive to condemn those who engage in such abuses while perpetuating the rules that allow them to benefit by doing so. Rather than using guesswork to assess the vulnerability of a proposed system, there is a well-developed body of science that can be applied. In many cases, when a system is found to be manipulable, there is a surprisingly easy way to fix it.

The next time we bemoan people exploiting loopholes to subvert the intent of rule makers, instead of asking, "What's wrong with those people?" let's instead ask, "What's wrong with the rules?" and then adopt a scientifically principled approach to fixing them.

Jason Hartline is an associate professor at Northwestern University.

Robert Kleinberg is an assistant professor at Cornell University.